# M.J. BRADLEY & ASSOCIATES

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Fax: 978-369-7712

## DOCUMENT TRANSMITTAL SHEET

TO: STEVE RAPP

FROM: STEVE PIPER

COMPANY: EPA REGION 1

DATE: 8-26-10

RE: CHELSEA TERMINAL ODOR CONTROL

NOTES/COMMENTS:

As a follow up to our recent telephone conversation, I am enclosing a copy of the air permit application submitted to the Massachusetts DEP to gain approval for the Chelsea Terminal ordor control system to be upgraded to a RTO control device in order to also serve as a VOC control device for the residual oil storage tank and residual oil truck loading operations. I am hopeful that the information contained within the application will answer many of your questions.

Don't hesitate to call me with an additional questions or data request 603-647-5746 ext 102.

# NON-MAJOR CPA APPLICATION FOR EMISSION CONTROL SYSTEM
# TRANSMITTAL NO. W213528

## CHELSEA SANDWICH LLC
## 11 BROADWAY
## CHELSEA, MASSACHUSETTS

Prepared for

Chelsea Sandwich LLC
11 Broadway
Chelsea, MA 02150

April 11, 2008

Prepared by

M.J. Bradley & Associates
1000 Elm Street, Second Floor
Manchester, NH 03101

# CONTENTS

# 1 INTRODUCTION

On behalf of Chelsea Sandwich LLC, an affiliate of Global Companies LLC, M.J. Bradley & Associates (MJB&A) submits to the Massachusetts Department of Environmental Protection (DEP), Northeast Regional Office (NERO), a Non-Major Comprehensive Plan Approval (CPA) Air Quality Permit application. This application package includes proposed emission limitations and information for an emission control system to be installed at the Chelsea Sandwich facility located at 11 Broadway, Chelsea, Massachusetts (Facility). The Facility previously installed a dry scrubbing odor control system designed to control total reduced sulfurs (TRS) per agreement with the City of Chelsea in response to odor complaints. While the system was effective at reducing odors, during routine environmental compliance monitoring and testing it was determined that the treatment bed life was much shorter than expected. Follow-up investigatory testing of the odor control system exhaust stream (collected from the residual oil storage tanks and residual oil loading rack lanes) revealed higher than expected VOC levels as opposed to those previously calculated using EPA-published emission factors. Because the higher VOC levels compromised the treatment bed life of the dry scrubbing odor control system and revealed the potential for Terminal VOC emissions to exceed the major source threshold, Chelsea Sandwich LLC is voluntarily proposing to install a Regenerative Thermal Oxidizer (RTO) as a means to effectively reduce odors and VOC emissions to sustain the current minor source status.

This document includes applicable BWP AQ 02, BWP AQ CPA-3, and BWP AQ SFP-5 application forms and supporting information, including the following:

- Project, Equipment and Emissions Descriptions — Section 2
- Figures/Illustrations — Section 3
- Application Forms — Section 4
- BACT Determination — Section 5
- Recordkeeping and Reporting — Section 6

# 2 PROJECT, EQUIPMENT AND EMISSIONS DESCRIPTION

The Chelsea Sandwich LLC facility, located at 11 Broadway in Chelsea, is essentially under the Tobin Bridge as illustrated in the Figure 3-1 topographical map. Figure 3-2 provides a site plan of the entire facility and identifies the location of the tanks, loading rack and emission control device that are the subject of this application.

This facility handles distillate and residual oil products. The facility operates under the standard industrial classification (SIC) code 5171, Petroleum Bulk stations and Terminals and receives petroleum products by ship or barge into onsite storage tanks and then loads over-the-highway trucks and barges from their storage tanks. Emissions at the facility occur as results of vapors displaced during filling of tanks and trucks and storage tank "breathing".

In an effort to address odor complaints from nearby residents in Chelsea, on May 6, 2005, it was agreed with the Chelsea Board of Health that a system would be installed at the Facility to control these odors. Because the petroleum odors are generally considered to be a result of Total Reduced Sulfurs (TRS), the emission capture system was designed to collect emissions from the residual oil storage tanks and the residual oil truck loading. The emission control system was designed to reduce TRS using a dry scrubbing media and did not require pre-approval permitting from the DEP.

Although the control device was effective at reducing odors, it was determined through the facilities routine compliance monitoring that the bed life was found to be shorter than expected. In response to the issues identified during the compliance monitoring and in accordance with established protocol, testing was conducted on the emission control inlet to evaluate the emission characteristics as a means to determine what was causing the bed to "breakthrough" in such a short period. Results of the testing revealed much higher than expected total VOC emissions.

The following sections provide information about the emission characteristics and the proposed new strategy for controlling odors and VOC emissions.

## 2.1 Facility Emissions Information

Chelsea Sandwich LLC is requesting emission and throughput limitations as a means to continue to be categorized as a minor source. Historically the Facility was categorized as a natural minor source of air pollution with VOC emissions less than 50 tpy at maximum potential throughputs, as calculated using EPA-published emission factors (AP-42 and TANKS models). After testing the inlet to the odor control system (includes exhaust from residual oil storage tanks and residual truck loading) it appeared that potential uncontrolled VOC emissions could exceed 50 tpy. The

newly calculated facility-wide potential VOC emissions with the proposed 95% capture of residual oil tank emissions, 90% capture efficiency of the residual oil truck loading emissions and 99% destruction efficiency of captured emissions from both is shown in the table below. The facility-wide emissions of other criteria pollutants represent byproducts of combustion based on AP-42 emission factors for the Facilty boilers and the RTO (except for NOx and CO from the RTO, which are based on vendor guarantees of 3 ppm NOx and 50 ppm CO).

| Pollutant | Potential Emissions (tpy) |
|---|---|
| **VOC** | 37.1 |
| **$NO_x$** | 36.0 |
| **$SO_x$** | 50.3 |
| **CO** | 11.8 |
| **PM** | 5.0 |
| **Total HAPs** | 5.6 |

Supporting calculations can be found in Appendix A.

## 2.2 Proposed Emission Control Device

Chelsea-Sandwich LLC is proposing to install a 9,000 scfm regenerative thermal oxidizer (RTO) to destruct the VOC and TRS emissions from the evaporative losses associated with the residual oil storage tanks and the residual oil truck loading operations. A diagram of the unit is provided in Figure 3-3. The vendor performance guarantee for the RTO is 99% destruction efficiency of VOC and TRS operating at a minimum chamber temperature of 1,500 F (design residence time is 1.0 seconds). Vendor specifications are provided in Supplemental Form BWP AQ SFC-5 and with backup information attached in Appendix C.

## 2.3 Proposed Emission Capture System

Emissions captured for control by the proposed RTO include those from the residual oil storage tanks and the residual oil truck loading. These sources contain the majority of TRS, which make them the target of the odor control strategy. The following describe the emission collection system for the two source types.

**Tank Vents**

The capture system for the residual oil storage tanks is a "T" arrangement illustrated in Figure 3-4 that maintains a constant draw of up to 850 cfm. The basis for the design flow rate is to handle the displaced air from the tank headspace during a filling operation that has a maximum pump rate of 9,000 barrels/hour. During times when the tank is not filling, the capture system will maintain a constant exhaust rate in order to capture vapor displacement associated with other

operations, such as tank-to-tank transfers, air sparging and any breathing emissions associated with the residual oil tanks. By design of the T arrangement, any portion of the exhaust rate that is not from the tank displacement will come from intake of fresh air. The purpose of the T design is to assure that the tank is always stabilized to atmospheric pressure in order to meet petroleum tank safety requirements that assure tanks do not distort due to overpressure or collapse due to vacuum. The capture efficiency rating by the design engineer is minimally 95%.

**Truck Loading**

The capture system for the residual oil truck loading is a flex hose arrangement illustrated in Figure 3-5 that maintains a constant draw of up to 300 cfm from each loading lane. The use of flex hose is necessitated to enable effective use for the different truck configuration that may load at the rack. Additionally, the residual loading is accomplished by a top-loading arm that goes down into the truck hatch. The flex hose is positioned by the operator beside the loading arm. The flex hose cannot have a tight connection, as it is necessary for the operator to view the oil level in the truck to eliminate any risk of overflow spillage. Because the truck has varying diameter hatches the capture efficiency rating by the design engineer is 90%.

## 2.4 Proposed Operating Limits

Chelsea-Sandwich LLC proposes to implement the following:

a) Potential VOC emissions associated with residual storage tanks are calculated assuming the maximum anticipated inlet concentration of 2,000 ppm (based on 4,300 scfm) and a 95% capture efficiency and a 99% control efficiency of the captured emissions. Based on this calculation the maximum RTO outlet concentration would be 20 ppm or 0.63 lb/hr (based on 4,300 scfm). While the RTO capacity is 9,000 scfm, the actual flow will be a function of efforts to optimize and calibrate the individual capture hoods. We expect the VOC pounds per hour to be relatively constants regardless of the flow.

b) Potential VOC emissions associated with residual oil truck loading will be calculated assuming the maximum anticipated inlet concentration of 2,000 ppm (based on 300 scfm per loading lane), a truck loading throughput limitation of 500,000,000 gallons per year of residual oil, and a 90% capture efficiency and a 99% control efficiency of the captured emissions.

c) Potential VOC emissions for the distillate portion of the terminal will be calculated using AP-42 emission factors and the product throughput. Truck loading rack throughput limitations for the distillate products will be:

   - Kerosene – 15,000,000 gallons/year
   - No. 2 Oil – 438,000,000 gallons/year

d) Potential VOC emissions from barge loading operations were calculated using AP-42 emission factors for the distillate products and a revised emission factor for residual products. Based on the testing performed on the exhaust from the residual oil truck loading rack the emissions were determined to be 433 times the AP-42 emission factor, the Barge Loading emission factor of 0.00009 lb/1,000 gal was changed to 0.039 lb/1,000 gal. The following products limits were used for Barge Loading:

- Kerosene – 10,000,000 gallons/year
- Distillate Oil – 60,000,000 gallons/year
- Residual Oil – 60,000,000 gallons/year

## 2.5 Property Line Noise Impact

As requested by DEP during the pre-application meeting, a noise impact assessment was conducted. The specific concern of the DEP was the noise associated with the bed switching mechanisms. According to the RTO manufacturer (Adwest) there is no noise data for Model RETOX 9.0 RT095 related to the bed switching. However, Adwest did feel comfortable saying that the noise associated with bed switching was less than the noise of the fan. With that said, Adwest provided the following center frequency sound pressure levels based on hemispherical, free field radiation, with a directivity factor of 2 at a measurement of 5 feet. Values are dBA:

| AVG | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1kHz | 2kHz | 4 kHz | 8kHz |
|---|---|---|---|---|---|---|---|---|
| 90 | 105 | 108 | 104 | 94 | 85 | 79 | 75 | 73 |

The location of the Facility is considered urban and is adjacent to a major urban thoroughfare (Tobin Bridge). MJB&A has assumed a background urban sound pressure level, $L_{90}$, of 67 dBA for general ambient conditions between midnight and 2:00 a.m. for comparison to property line levels.

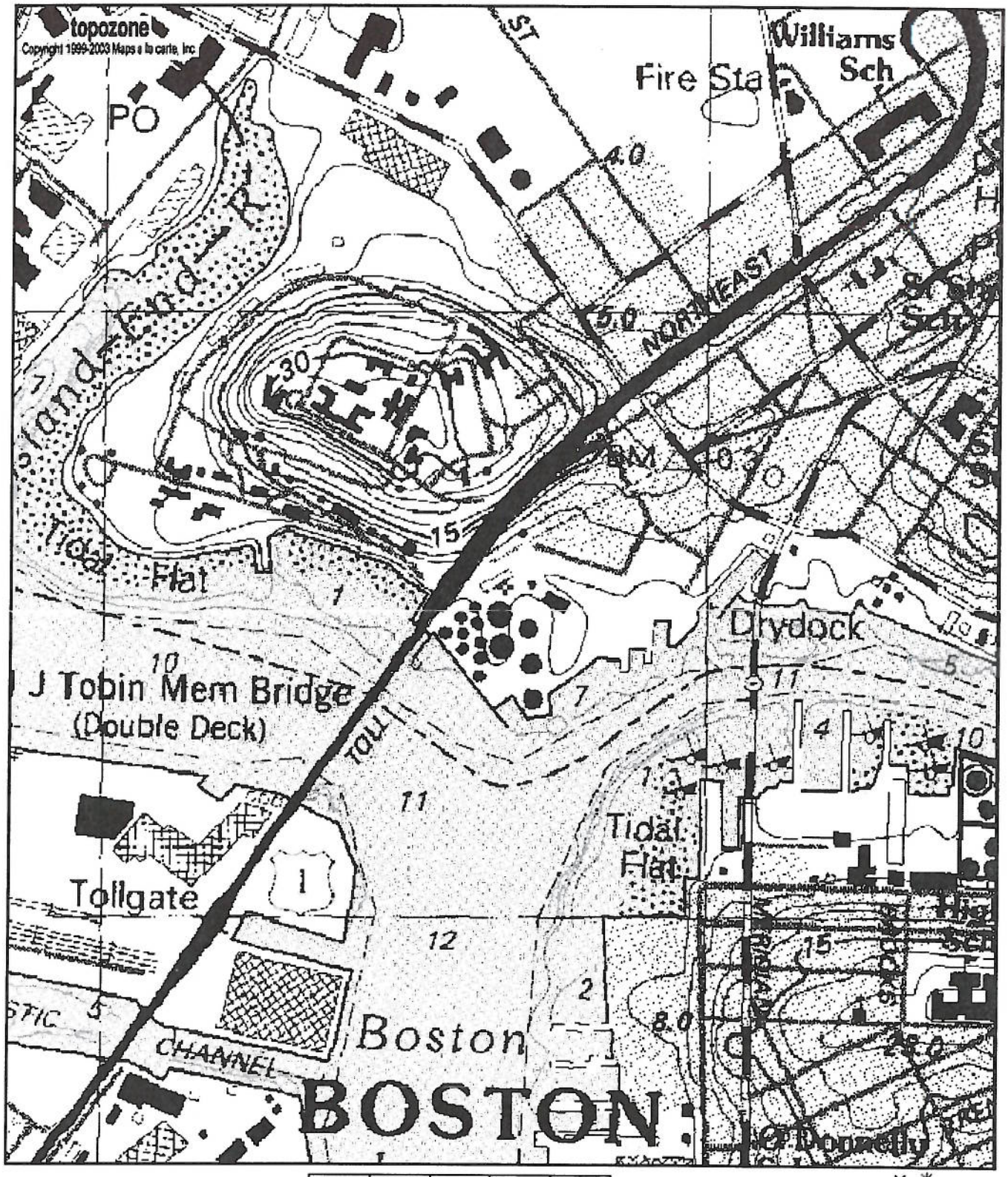
Appendix D presents the calculation to determine the nearest property line, based on site plans that were provided by Chelsea Terminal. The "source" is assumed to be the RTO. The ground-level property line is 20 feet from the RTO. (Refer to Attachment 3-2 for the Site Plan).

In summary, a dBA value of 58 was calculated at the property line based on the sound pressure decay over 20 foot and a minimal 20dB drop caused by the existence of a brick building located directly between the RTO and the property line. Using the same calculations for the additional distance to the nearest resident (50 ft), the noise level was calculated to be 50 dB. Both the fence line and nearest resident impacts were below the background level of 67dBA. In addition, examination of spectral data does not exhibit any pure tone conditions.

# 3 FIGURES/ILLUSTRATIONS

The following illustrations, as required by the CPA application, have been included in this section:

- Topographic Site Map — Figure 3-1
- Site Plan — Figure 3-2
- Tank & Truck Capture Systems — Figures 3-3 and 3-4
- RTO Diagram — Figures 3-5, 3-6, 3-7 and 3-8




UTM 19 331662E 4694549N (NAD27)

**Polonia Playground, USGS Boston North (MA) Quadrangle**

Projection is UTM Zone 19 NAD83 Datum

M=-15.281
G=-1.379

PLANT NORTH

BROADWAY

Water Hydrant

Island

TRUCK SERV. BLDG.

GUARD RAIL

SEA WALL

Water Hydrant

Island

(6) Fire Dept Alarm Pull Box

Lab | Locker Room

Truck Wash Area

Water Hydrant

Dispatch Office

Manual Controls for L.R Fog Sys.

Fire Dept Alarm Pull Box (6)

6" WATER

6" WATER

10"

10"

10'

TK. 203 #6 F.O.

10'

TK. 204 #6 F.O.

TK. 205 #2 F.O.

Heat Sensor Devices

TRUCK RACK

Fire Fog Sprinkler Sys.

6" WATER

12" CITY WATER MAIN

TK. 202 #6 F.O.

TK. 201 #2 F.O.

6" WATER

12" BOAT AND OIL CONTAINMENT BOOM IN BUILDING

Water Hydrant

BOILER HSE.

PUMP HSE.

TOP OF SLOPE

DOCK

Foam Hose for Loading Rack (inside bldg.)

Manual LR Fog System Controls

Electronic Fire Fog Control for LR.

TK.101 #2 F.O.

TK.102 #6 F.O.

TK.103 #6 F.O.

TK.104 #6 F.O.

TK.105 #2 F.O.

1-8"

1-8"

8"

2-8"

TK.106 #6 F.O.

TK.107 #2 F.O.

TK.108 #2 F.O.

TK.109 #2 F.O.

CONC. DIKE WALL

STEEL SHEATHING ELMHEAD

MYSTIC RIVER

## LEGEND

1. FOAM HOUSE, FIRE PROTECTION EQUIPMENT
2. 2-2½" FOAM HYDRANT (HOSE STATION) 600-S NOZZLES
3. 4-2½" FIRE DEPT. PUMPER WATER CONNECTIONS
4. 2½" WATER HYDRANT
5. 2½" FOAM HYDRANT
6. FIRE ALARM PULL BOX
7. FOAM VALVES IN SUB-SURFACE PIT

---◁ YARD WATER HYDRANTS

—— WATER LINES

—◀ YARD FOAM HYDRANTS

—— ABOVE GROUND
- - - - BELOW GROUND
FOAM LINES

—⋈— FOAM SYSTEM CONTROL VALVES

—● FOAM CHAMBERS @ TANKS

NOTE:
FOR DETAILS OF LIQUID FOAM SYSTEM SEE DWGS. B0-24 & B0-25

TK202 (2) 10" VENTS
203 (2) 10" VENTS
204 (2) 10" VENTS

TK106 2 (8" VENTS)
TK102 1 8"
103 1 8"
104 1 8"

SCALE 50' 0 50' 100' 150' 200'

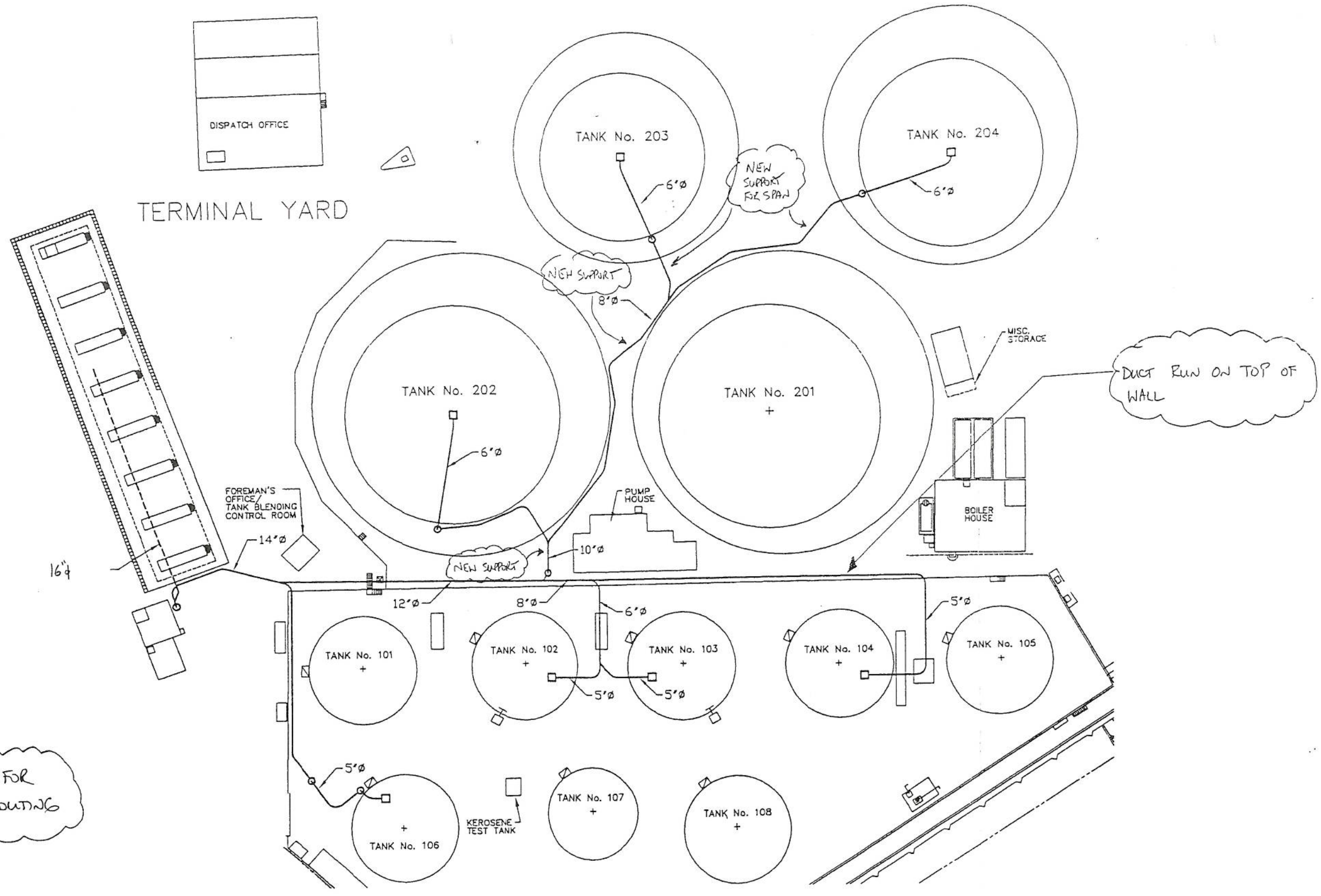
PITTSTON PETROLEUM INC.
CHELSEA MASS.

FIRE PROTECTION
LIQUID FOAM SYSTEM

RECEIVED
JUL 10 8 39 AM '01
INSPECTIONAL SERVICES

RECEIVED
JUL 17 10 58 AM '01
INSPECTIONAL SERVICES

# TERMINAL YARD




16'

SEE FIELD SKETCHES FOR DETAILS ON DUCT ROUTING

| REV. | REVISION | DATE | BY |
|---|---|---|---|
| | | | |



CLIENT: GLOBAL PETROLEUM

PROJECT: ODOR ABATEMENT SYSTEM

SCALE: NTS

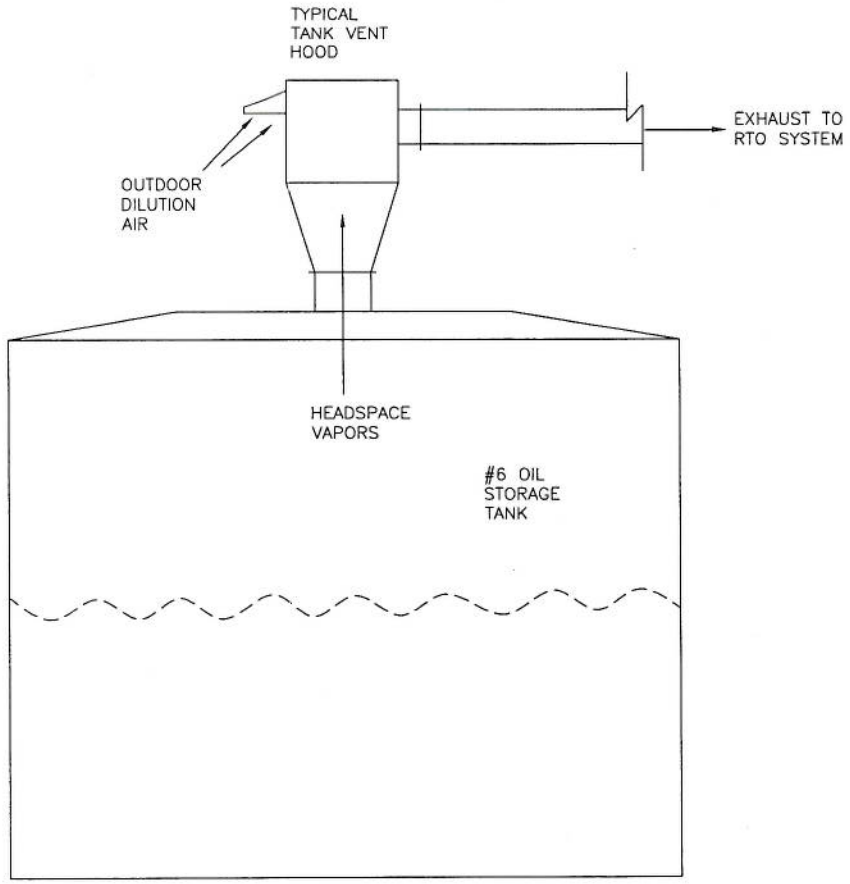
DRAWN BY: DR

DATE: 07/05/05

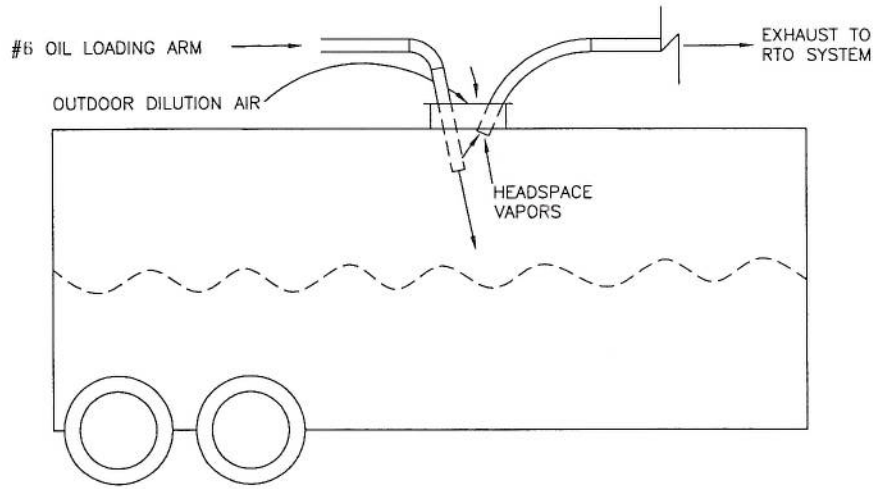
TITLE: DUCTING LAYOUT


APPLIED CONTAMINANT CONTROL LTD.
507, 10240 - 124 ST
EDMONTON, ALBERTA
CANADA T5N 3W6
(780) 413-6934


DWG # 24654 - DUCTING




#6 OIL TANK VENT VAPOR CAPTURE




#6 OIL TRUCK FILLING VAPOR CAPTURE

NOTES

| REV. | REVISION | DATE | BY |
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CLIENT: CHELSEA–SANDWICH TERMINAL, LLC

PROJECT: #6 OIL RTO SYSTEM

SCALE:

DRN BY: DTM

DATE: MAR. 08'

TITLE: VAPOR CAPTURE SKETCH

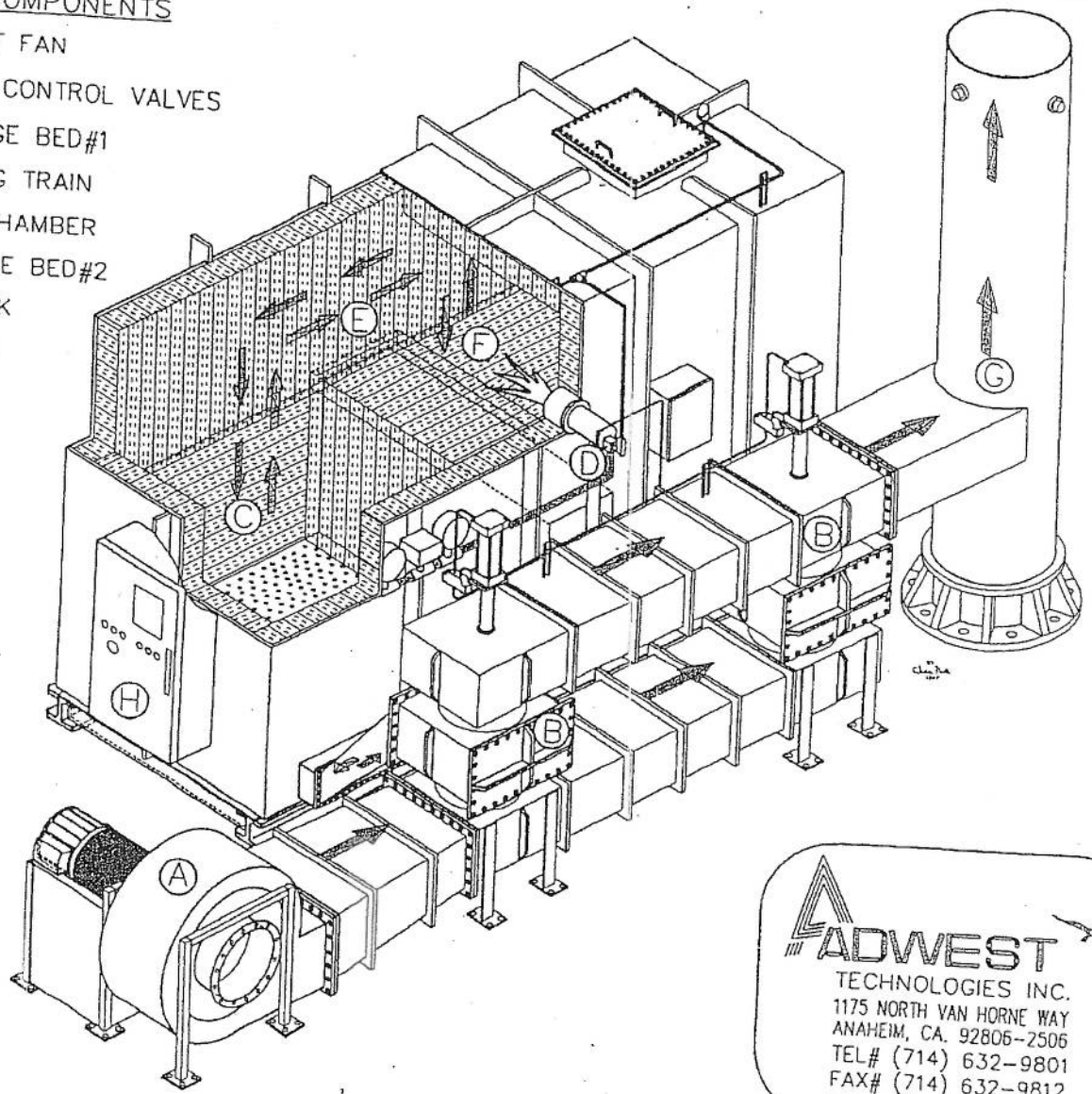
DWG # VAPOR CAPTURE

APPLIED CONTAMINANT CONTROL LTD.
800, 10240 – 124 St
EDMONTON, ALBERTA
CANADA T5N 3W6
(780) 413-6934

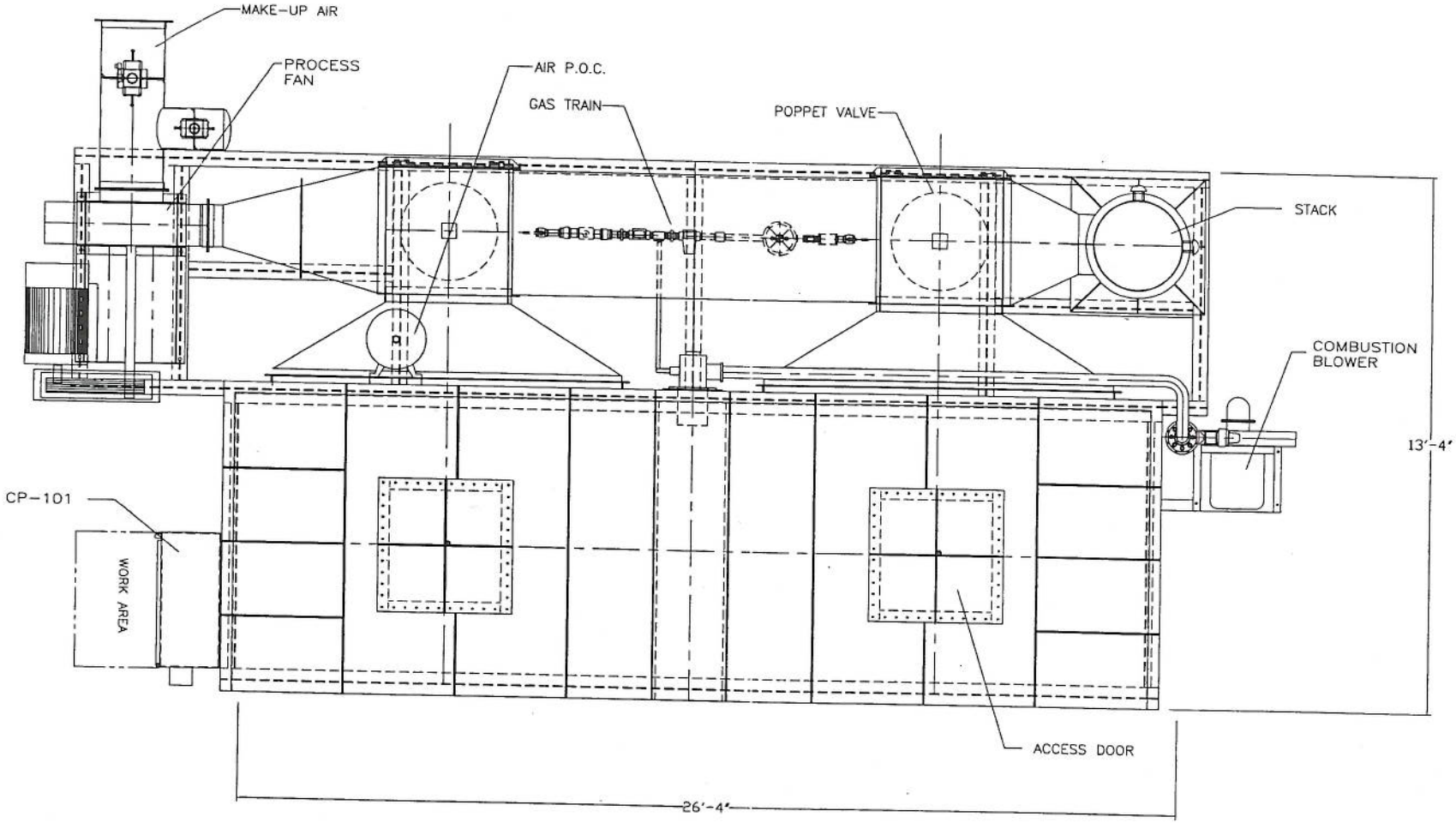
# RETOX® REGENERATIVE THERMAL OXIDIZER SYSTEMS

MAJOR RETOX
RTO OXIDIZER COMPONENTS

- (A) FORCED DRAFT FAN
- (B) POPPET FLOW CONTROL VALVES
- (C) HEAT EXCHANGE BED#1
- (D) BURNER/PIPING TRAIN
- (E) COMBUSTION CHAMBER
- (F) HEAT EXCHANGE BED#2
- (G) EXHAUST STACK
- (H) PLC CONTROLS




ADWEST
TECHNOLOGIES INC.
1175 NORTH VAN HORNE WAY
ANAHEIM, CA. 92805-2506
TEL# (714) 632-9801
FAX# (714) 632-9812
www.odwestusa.com




NOTES

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CLIENT: GLOBAL PETROLIUM

PROJECT: GLOBAL RTO

SCALE: NTS

DRN BY: KF

DATE: FEB 6/08

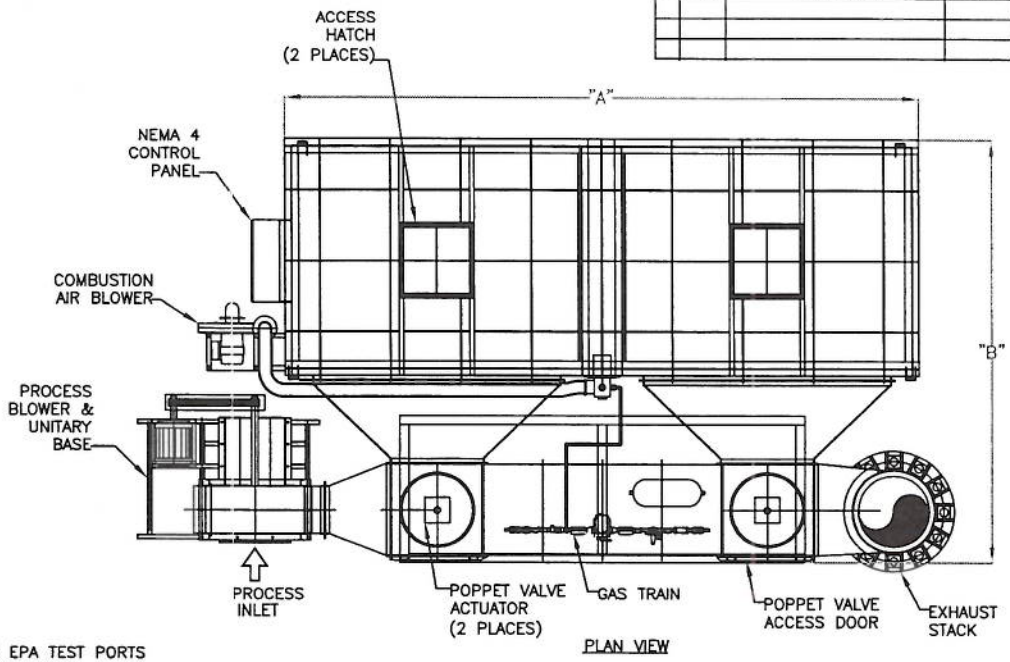
TITLE: PRELIMINARY VIEWS

DWG #: PROPOSAL

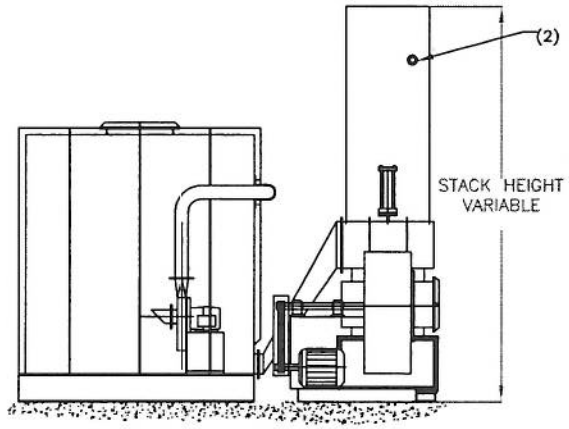
APPLIED CONTAMINANT CONTROL LTD.
600, 10240 - 124 St
EDMONTON, ALBERTA
CANADA T5N 3W6
(780) 413-6934

| RTO | DIMENSIONS | | | |
|---|---|---|---|---|
| SCFM | A (LENGTH) | B (WIDTH) | C (HEIGHT) | APPROX. WEIGHT LBS. |
| 1,000 | 8' – 6" | 7' – 1" | 7' – 1" | 9,200 |
| 1,500 | 9' – 8" | 7' –11" | 7' – 2" | 10,000 |
| 2,000 | 11'– 0" | 8' – 5" | 7' – 3" | 14,400 |
| 3,000 | 12'– 2" | 10'– 4" | 8' – 1" | 18,700 |
| 4,000 | 14'– 0" | 10'– 7" | 8' – 4" | 23,000 |
| 5,000 | 16'– 8" | 10' –10" | 8' – 3" | 28,800 |
| 6,000 | 19'– 2" | 11'– 8" | 8' –11" | 33,100 |
| 7.500 | 21'– 0" | 12' –0" | 9' –7" | 36,700 |
| 9,000 | 24'– 2" | 12'– 8" | 10'–10" | 46,300 |
| 10,000 | 26'– 4" | 13'– 4" | 10'–10" | 49,700 |
| 12,000 | 24'– 0" | 15'– 12" | 10'–7" | 58,900 |
| 13,000 | 25'– 6" | 16'– 2" | 10'–8" | 60,400 |
| 15,000 | 25'– 6" | 18'– 7" | 10'–11" | 68,900 |
| 17,500 | 26"– 10" | 21'– 7" | 11'–4" | 79,800 |
| 20,000 | 29'– 4" | 21'– 11" | 11'–8" | 87,300 |
| 22,500 | 32'– 6" | 22'– 5" | 12'–0" | 94,500 |
| 25,000 | 35'– 8" | 22'– 7" | 12'–4" | 113,600 |
| 27,500 | 38'– 10" | 23'– 0" | 12'–4" | 121,400 |
| 30,000 | 42'– 0" | 23'– 3" | 12'–4" | 129,600 |
| 32,500 | 45'– 2" | 23'– 3" | 12'–5" | 135,300 |
| 35,000 | 46'– 0" | 23'– 3" | 12'–5" | 142,800 |
| 37,500 | 42'– 0" | 24'– 3" | 12'–4" | 148,600 |
| 40,000 | 48'– 0" | 24'– 6" | 12'–3" | 158,400 |
| 42,500 | 53'– 0" | 24'– 6" | 12'–3" | 164,400 |
| 45,000 | 48'– 8" | 25'– 9" | 12'–3" | 169,600 |
| 50,000 | 54'– 6" | 26'– 5" | 12'–3" | 181,500 |

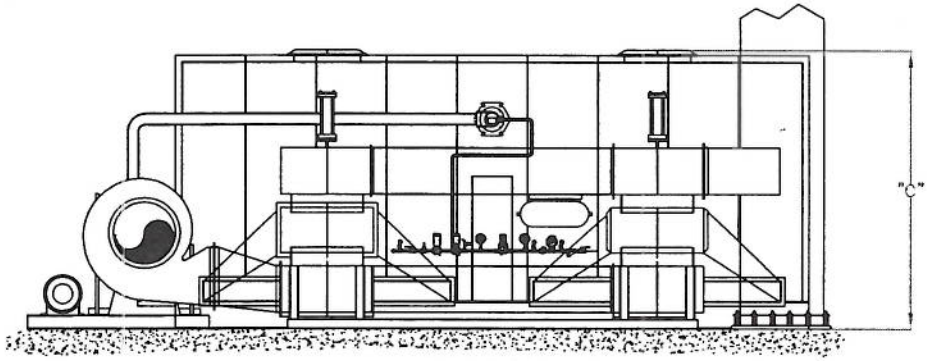
| revisions | | | |
|---|---|---|---|
| zone | description | date | approved |
| | | | |




PLAN VIEW




SIDE ELEVATION VIEW




FRONT ELEVATION VIEW

NOTES:

1.– ALL DIMENSIONS ARE W/O FAN AND STACK.
2.– PRELIMINARY: NOT TO BE USED FOR CONSTRUCTION.
3.– ALL SPECS SUBJECT TO CHANGES W/O NOTICE:
4.– WEIGHTS ARE W/O FAN.

ALDWEST TECHNOLOGIES INC.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

DO NOT SCALE DRAWING

date 13 JUNE 03

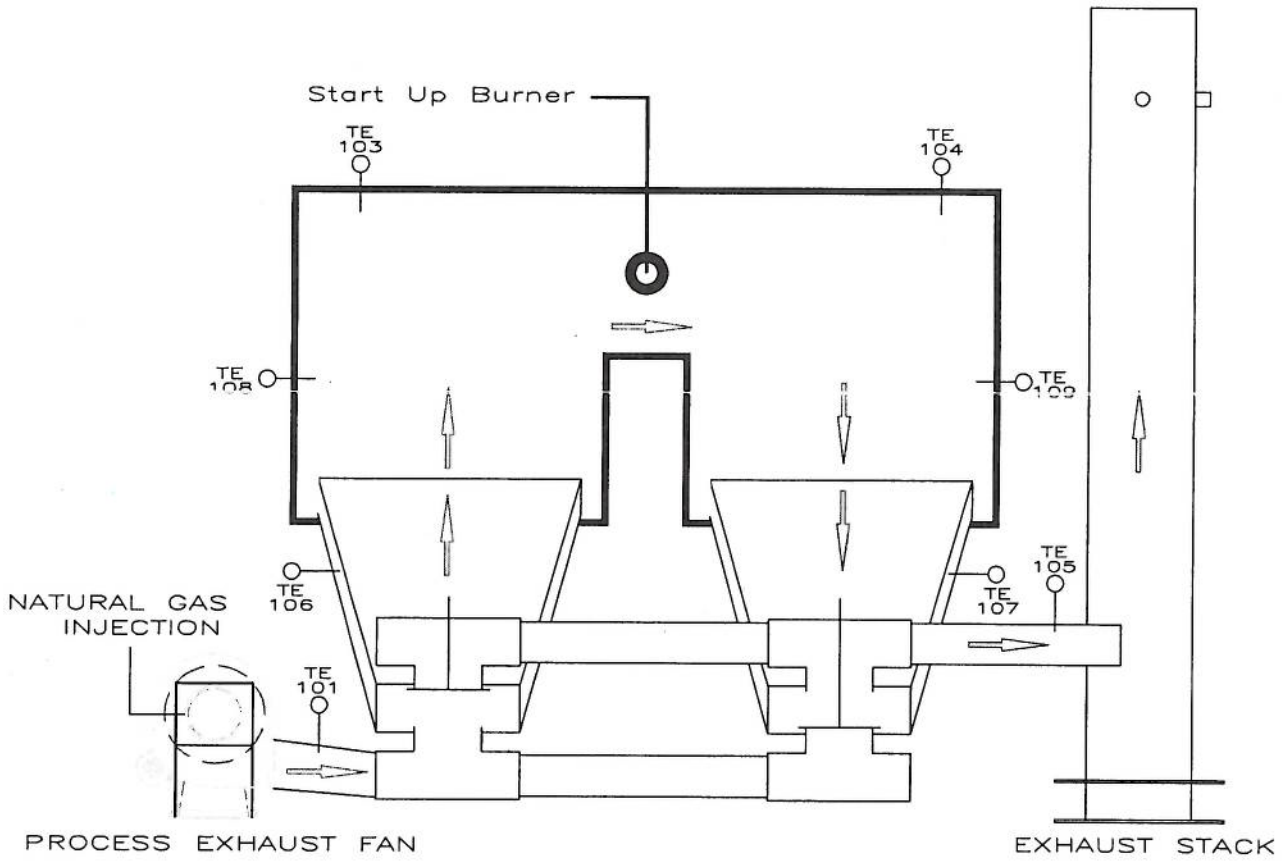
project: RETOX® RTO OVERALL DIMEMSIONS
RTO–95 REGENERATIVE THERMAL Oxidizer Unit

title: GENERAL ARRANGEMENT

| size | foam no. | dwg no. | approved by | rev. |
|---|---|---|---|---|
| D | | | | – |

| scale | drawn by | checked by | sheet |
|---|---|---|---|
| NONE | ROGERS | | 1 OF 1 |

# ADWEST RETOX
# REGENERATIVE THERMAL OXIDIZER
# MODE OF OPERATION




ADWEST TECHNOLOGIES, INC.



| DRAWN BY | DATE | APPROVED BY |
|---|---|---|
| R.G.W. | 15 JUN '02 | RICHARD WHITFORD |

TITLE

ADWEST RETOX
REGENERATIVE THERMAL OXIDIZER
MODE OF OPERATION

# 4 APPLICATION FORMS

This section contains the appropriate Massachusetts DEP "Non-Major Comprehensive Plan Approval" permit application forms (BWP AQ 02) as well as "Comprehensive Plan Approval Application for Non Fuel Utilization Facilities" application forms (BWP AQ CPA-3) and Supplemental Forms for Afterburners (BWP AQ SFP-5) and for Survey of Noise Potential application forms (BWP AQ SFP-3). The corresponding permit fee of $1,930 has been forwarded to the appropriate post office box in Boston for processing through the proper channels. A list of materials and information required for a complete permit application is contained in Form BWP AQ CPA-3. The location of the required items within this permit application package is as follows:

- Plot Plan — Section 3
- Topographic Map — Section 3
- Breech/Stack Plan — Section 3
- CPA Forms — Section 4
- Elevation Plan — Section 3
- Emission Calculations — Appendix A
- BACT Determination — Section 5
- Standard Maintenance and Operating Procedures — Appendix B

The remaining information is supplied on the appropriate CPA Forms.

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality
**BWP AQ 02 Non-Major Comprehensive Plan Approval**
**BWP AQ 03 Major Comprehensive Plan Approval**
Comprehensive Plan Approval Project Summary Application

W213528
Transmittal Number

1191617
Facility ID (if known)

## A. Facility Data

**INSTRUCTIONS**

This form is to be completed when filing for a comprehensive Plan Approval (CPA). A CPA is required for projects exceeding the thresholds for that of a Limited Plan Approval (LPA) and in other cases as determined by the Department. When filing a CPA, one or more of the following forms is also required according to the type of project:
BWP AQ CPA-1 to WP AQ CPA-5 for equipment;
BWP AQ SFP-1 to BWP AQ SFP-5 for VOC application and noise;
BWP AQ SFC-1 to BWP AQ SFC-6 for pollution control equipment.

1. Chelsea Sandwich LLC
Facility Name
11 Broadway, Chelsea, MA 02150
Location

2. Is the project for a new facility? ☐ Yes ☒ No

3. Previously approved? ☐ Yes ☒ No

If yes, list the previously issued air quality approval(s) for this process and associated emission limits in the table provided.

| Application Number | Approval Date |
|---|---|
| | |
| | |
| | |

4. Which permit category are you applying for? ☒ BPW AQ 02 ☐ BWP AQ O3

## B. Applicability

1. POTENTIAL EMISSIONS are to be calculated from the maximum capacity of the equipment to emit pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the equipment to emit a pollutant, including air pollution control equipment, restriction on hours of operation, or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design only if the limitation is specifically stated in (a) plan approval(s) or if the facility proposes to incorporate such a restriction into this current plan approval. Fugitive emissions, to the extent quantifiable, are included in determining the potential emissions. Unless otherwise documented, potential emissions shall be based on 8,760 hours per year operation of source.

**Current Potential Emissions** means the potential emissions for the entire facility as it currently exists. If this is for a new facility, then enter N/A in this column.

**Actual Baseline Emissions** means the highest actual emissions for the facility in either of the previous two years. If this is for a new facility, then enter N/A in this column.

**Proposed Potential Emissions** means the potential emissions for this proposed project alone.

## B. Applicability (cont.)

| Air Containment* | Current Potential Emissions (TPY)** (after control) | Actual Baseline Emissions (TPY) | Proposed Potential Emissions (TPY) (after control) |
|---|---|---|---|
| Particulate | 5.0 | 1.6 | 5.0 |
| $SO_x$ | 50.1 | 15.8 | 50.3 |
| $NO_x$ | 35.1 | 11.0 | 36.0 |
| VOC | 48.3 | 6.9 | 37.1 |
| HOC | | | |
| Lead | | | |
| CO | 3.2 | 1.0 | 11.8 |
| HAP | | | 5.6 |
| Other | | | |

*Complete only for air quality contaminants that will be affected by this project.
**TPY = tons per year

2. Is this project subject to:

- 310 CMR 7.00 Appendix A- Nonattainment Review? ☐ Yes ☒ No

  If yes, also complete section C- Nonattainment Review.

- Was netting used to avoid applicability? ☐ Yes ☒ No

  If yes, also complete Section III – Nonattainment Review

- Prevention of Significant Deterioration Permit (PSD) 40 CFR 52.21? ☐ Yes ☒ No
  Note: PSD applications are filed with the U.S. Environmental Protection Agency (EPA).
  If yes, also complete section D – PSD.

- Was netting used to prevent PSD? ☐ Yes ☒ No
  Note: PSD questions should be directed to EPA.
  If yes, also complete section D – PSD.

- New Source Performance Standards (40 CFR 60)? ☐ Yes ☒ No

If yes, which subpart?

## B. Applicability (cont.)

- National Emissions Standards for Hazardous Air Pollutants (NESHAPS) – 40 CFR 61:

☐ Yes ☒ No _____ If yes, which subpart?

- Maximum Achievable Control Technology (MACT), 40 CFR 63?

☐ Yes ☒ No _____ If yes, which subpart?

## C. Nonattainment Review

This section must be completed only if the construction or modification occurring at the facility is subject to 310 CMR 7.00 Appendix A (Nonatttainment Review) ***or*** would be subject to Nonatttainment Review if netting did not occur.

**Offsets** and **Netting**

1. If the proposed project would be subject to 310 CMR 7.0 Appendix A - Nonattainment Review in the absence of netting, or if emission reduction credits are used as offsets as part of the application, what is being shutdown, curtailed or further controlled to obtain the emission reduction credit (netting is not allowed to avoid review under 310 CMR 7.02):

   Emission reduction credits must be part of an enforceable plan approval to be used for either "netting out" or "offsetting emission increases".

   Not Applicable

2. For the source of emission credits, complete the following table:

| Air Containment | Actual Baseline Emissions (TPY) | New Potential Emissions (TPY) (after control) | Emission Reduction Credit (TPY) |
|---|---|---|---|
| Not Applicable | | | |
| | | | |
| | | | |
| | | | |

**Actual Baseline Emissions** means the average actual emissions for the source of emission credits in the previous two years.

**New Potential Emissions** means the potential emissions for the source of emission credits after project completion.

**Emission Reduction Credit** means the difference of Actual Baseline and New Potential Emissions.

## C. Nonattainment Review (cont.)

3. If emission reduction credits come from a facility other than where the construction or modification occurs, provide the name and location of the facility:

Not Applicable

## D. Affirmative Demonstration of Compliance

The signature below provides the affirmative demonstration pursuant to 310 CMR 7.02 (3) that any facility (ies) in Massachusetts, owned or operated by the proponent for this project (or by an entity controlling, controlled by or under common control with such proponent) that is subject to 310 CMR 7.00, et seq., is in compliance with, or on a Department approved compliance schedule to meet, all provisions of 310 CMR 7.00, et seq., and any plan approval, order, notice of noncompliance or permit issued thereunder. This form must be signed by a responsible official working at the location of the proposed new or modified facility. Even if an agent has been designated to fill out this form, the responsible official must sign it. (Refer to the definition given in 310 CMR 7.00.)

Certification: I certify that I have examined the responses provided herein and that to the best of my knowledge they are true and complete.

Ronald Kenny
Print name

Ronald W Kenny
Signature of responsible official

Regional Operations Manager
Position / title

Chelsea Sandwich LLC
Representing

April 11, 2008
Date

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality

# BWP AQ CPA-3 (for use with BWP AQ 02, 03)

Comprehensive Plan Approval Application for Non Fuel Emissions

W213528
Transmittal Number

1191617
Facility ID (if known)

## A. Applicability

This form is to be used to apply for approval to construct, substantially reconstruct or alter a facility, where the portion of the facility being constructed, substantially reconstructed or altered would result in an increase in potential emissions of equal to or greater than five tons per year of any criteria pollutant, or equal to or greater than five tons per year of any single other air contaminant.

Please note that an emission reduction of the same air contaminant at the facility may not be subtracted from the emissions resulting from the construction, substantial reconstruction or alteration to bring emissions below the five tons per year threshold. Products of combustion from any fuel utilization facility are not included in the sum. Please refer to 310 CMR 7.02(5)

## B. Materials that Constitute a Comprehensive Plan Approval Application – Non Fuel Emissions

Proposed projects, which are subject to Comprehensive Plan Approval Application requirements for industrial and commercial facilities, must submit the following items to the appropriate Regional Office for technical review and approval.

☒ **Manufacturer's Specifications** and brochures for process equipment, add-on air air pollution control equipment, fans/blowers, etc.

The following items should be submitted in duplicate and must bear the seal and signature of a Massachusetts Registered Professional Engineer

☒ **CPA Forms** should reflect the new or modified process equipment at the facility.

☒ **Supplemental Forms** for add-on air pollution control equipment fuel equipment, or for volatile organic compounds (VOCs), if applicable.

☒ **Standard Operating Procedure And Standard Maintenance Procedure** – See section J and section K of this form.

☒ **Plot Plan** – Scaled drawing indicating the outlines of the significant structures within 1500 feet of the building containing this project. Topographic contours may be shown on this plan or on separate plan.

☒ **Potential Emissions** – Detailed listing of proposed restrictions limiting potential emissions (see section E).

☒ **Topographic Map** – United States Geodetic Survey (USGS) map, or equivalent, showing the topographic contours for a distance of 1500 feet beyond the boundary lines in every direction. (This may be part of Plot Plan.)

☐ **Roof Plan; Building Elevation Plan** – Scaled drawings indicating the locations of all fresh air intakes, windows, and doors.

☒ **Schematic Process Diagram** – Dimensioned plan showing process equipment, hoods, ductwork, dampers, fans, temperature/pressure sensing devices, other monitors, air pollution control equipment, and all vents, by-passes, or discharges to atmosphere.

☒ **Calculations** – Detailed calculation sheets showing the manner in which the pertinent quantitative data was determined. This is especially important for calculated emission rates, sizing of air pollution control equipment, and sizing of air moving equipment.

☒ **Miscellaneous** – The Department may require other materials if it considers them necessary to the plans review. For example, modeling studies may be required, or monitoring data, or a noise survey. These special items are not usually requested except on the more complex or larger projects.

☒ **BACT Analysis**

## C. Project Description

1. For the purpose of determining a potential emission rate (or rates), give the maximum operating times proposed for this project.

   24
   a. hours/day

   7
   b. days/week

   52
   c. weeks/year

2. Fully describe the process equipment that will be constructed, substantially reconstructed or altered, identifying:

   a. maximum capacity of process equipment

   b. chemical identity of all raw materials

   c. chemical identity of all finished products

   d. sequence of process events keyed to the Process Diagram required in Section B

   e. process temperatures

   f. process pressures

   Use additional sheets of paper if necessary. If volatile organic compounds (VOC) are used in the application of coatings, attach separate formulation sheets and submit a BWP AQ SFP-1 form.

   The oil terminal is an existing facility that is installing an emission control device to reduce odors per agreement with the City of Chelsea. The control system will also reduce VOC emissions to assure that the facility remains a minor source.

3. Specify maximum consumption/usage rates of each raw material:

   **RACK** - No. 6 oil - 500 million gal/yr, No. 2 oil - 438 million gal/yr, Kerosene - 15 million gal/yr

   **BARGE** – No. 6 oil – 60 million gal/yr, No. 2 oil – 60 million gal/yr, Kerosene – 10 million gal/yr

4. Describe storage/handling procedures for raw materials:

   No. 6 oil is stored in heated fixed roof tanks. No.2 oil/kerosene is stored in non-heated fixed roof tanks.

## C. Project Description (cont.)

5. Specify maximum production rate(s) of finished products:

   Same as raw materials.

6. Describe storage/handling procedures for finished products:

   Same as raw materials.

7. Describe features of equipment layout designed to allow for future growth, emission control device add-on, or stack testing ports:

   The maximum flow capacity of the emission control device is approximately twice the capacity currently required.

8. Describe how fugitive emissions will be minimized especially during process upsets, or disruptions:

   The capture system is designed for an exhaust rate capable of handling the most emissive tanks events, i.e., filling at a maximum pump rate. (See Process Description – Section 2)

9. Explain those aspects of the design that have been required because of other environmental concerns, or safety concerns, or other regulations, such as; construction materials handling practices system interlocks, waste disposal procedures, etc.:

   The initial purpose of the control system was to reduce odors through the collection and control of total reduced sulfur (TRS) compounds from the heated residual oil tanks and rack loading lanes. The proposed control system will additionally control VOC emissions

## D. Emissions Data

1. Maximum Gaseous Emissions Rates:

| | Chemical Name | Before Control (pounds/hour) | After Control (pounds/hour) | After Control (ppm of volume) |
|---|---|---|---|---|
| a. | VOC Control Exhaust | 66 | 0.63 | 20 |
| b. | VOC fugitive | | 3.7 | |
| c. | TRS Control Exhaust | .24 | 0.002 | 0.1 |
| d. | TRS fugitive | | 0.013 | |

2. Maximum Particulate Emissions Rates:

| | Chemical Name | Before Control (pounds/hour) | After Control (pounds/hour) | After Control (grains/DSCF)* |
|---|---|---|---|---|
| a. | Not Applicable | | | |
| b. | | | | |
| c. | | | | |

* grains per dry standard cubic foot

3. Indicate how the above emission rates were obtained, and attach appropriate calculations and documentation:

Testing using Methods 25, 25A and TO-3 for VOC

Testing using Method ASTM D 5504-1 for TRS

4. a. Describe the potential for visible emissions (opacity) from this project:

None

b. Describe the potential for odor impacts from this project:

The purpose of the control system being proposed is to reduce odors.

## E. Potential Emissions

POTENTIAL EMISSIONS are used to determine applicability to air pollution control regulations and compliance fees. Unless otherwise restricted, potential emissions are calculated from the maximum operational capacity of the equipment as described in section C operated 8,760 hours per year. If you wish to limit potential emissions you must complete this section; this will be treated as part of the facility design and the limitation will be specifically stated in this Plan Approval.

1. In order to issue a permit limiting the facility's potential emissions, the Department must have a method to monitor compliance with the restriction. In other words, an enforceable permit condition must be available to the Department. The following questions require the facility to set a limit on the maximum amount of raw materials used (per month and per year) and therefore, the maximum amount of emissions possible. This will become the means to monitor and enforce the restriction. Alternative methods of restricting potential emissions will be evaluated on a case-by-case basis and the applicant should contact the Department before proposing such alternatives. Any such alternative method must be consistent with the U.S. EPA's June 13, 1989 guidance entitled, "Guidance on Limiting Potential to Emit in New Source Permitting". (Copies of this guidance are available from DEP offices).

Note: This raw material restriction will become the facility's allowable usage. This amount can never be exceeded without prior Department approval.

| | Raw Material | Amount Used in Equipment 1 | | Amount Used in Equipment 2 | | Amount Used in Equipment 3 | | Total Used | |
|---|---|---|---|---|---|---|---|---|---|
| | | per month | per year | per month | per year | per month | per year | per month | per year |
| R | Kerosene | 25 m | 50 m | | | | | 25 m | 50 m |
| | No. 2 oil | 219 m | 438 m | | | | | 219 m | 438 m |
| | No. 6 oil | 250 m | 500 m | | | | | 250 m | 500 m |
| B | Kerosene | 5 m | 10 m | | | | | 5 m | 10 m |
| | No. 2 oil | 30 m | 60 m | | | | | 30 m | 60 m |
| | No. 6 oil | 30 m | 60 m | | | | | 30 m | 30 m |

m = million gallons

**R = Rack**
**B = Barge**

2. Describe any other physical or operational limitation on the capacity of the equipment to emit a pollutant, including air pollution control equipment, restriction on hours of operation, or on the type or amount of material combusted, stored or processed that will be used to restrict emissions:

Byproducts of combustion emissions from the RTO reflect the maximum natural gas use based on the burner size and 8,760 hours per year.

## F. Air Pollution Control Equipment

If new air pollution control equipment is proposed or if existing control equipment will be modified or affected by this project, then an equipment specific Supplemental Form must be submitted.

1. Is Emission Control System:

   ☒ Proposed? ☐ None?

   Existing? (if existing, supply previous Approval number )

   Regenerative Thermal Oxidizer (RTO) being proposed.
   a. If proposed or existing, describe:

   A carbon system initially designed to remove Total Reducted Sulfurs (TRS) is being replaced.
   b. If existing, described purpose changed:

2. Control Efficiency:

   Capture Efficiency (CE)

   90 for Residual Oil Truck Loading, 95 for Residual Oil Tanks
   Percent by weight pollutants captured by the ventilation system

   Destruction Efficiency (DE)

   99
   Percentage by weight pollutants destroyed or captured in control device

   Overall Control Efficiency:

   89 for Residual Oil Truck Loading, 94 for Residual Oil Tanks
   Percentage by weight of overall efficiency of the control system (CE X DE)/100

   Describe how capture efficiency was derived:
   Estimate provided by design engineer based on configurator and design capture velocity.

3. Does this application represent Best Available Control Technology (BACT) as stated in Regulation 310 CMR 7.O2 (3)(j)6?

   ☒ Yes ☐ No

   a. If yes, is required supplementary documentation attached?

   ☒ Yes ☐ No

   b. If no, explain why this project is exempt:

## G. Air Handling System

This section is for the description of fans and those flow parameters associated with the processes and/or the air pollution control equipment.

| | | Fan A | Fan B | Fan C |
|---|---|---|---|---|
| 1. | Identify fan (from process schematic) | RTO Fan | | |
| 2. | Fan Manufacturer | Air Pro Fan | | |
| 3. | Fan Model Number | IEAH 447 | | |
| 4. | Fan Type (axial, centrifugal etc.) | Centrifugal | | |
| 5. | Capacity (in SCFM) | 9,000 | | |

Manufacturer's fan performance curve or rating curve, with operating point indicated, must be submitted with this application if the fans are an integral part of the installed or modified equipment.

6. Fan Operating Point in this System

| | | Fan A | Fan B | Fan C |
|---|---|---|---|---|
| a. | Actual RPM | 1,750 | | |
| b. | Temperature at the fan (°F) | Ambient | | |
| c. | Fan pressure (static pressure, in $H_2O$) | 30 | | |
| d. | Actual flow rate of fan (ACFM) | 12,400 | | |
| e. | Actual horsepower requirements | 69 bhp | | |

## H. Miscellaneous Data

1. Number of employees at this facility

   11

2. Standard Industrial Classification (SIC) Code for this facility

   5171

3. Does municipal water supply to your process operations have the required back-flow preventer?

   ☒ Yes ☐ No

   If Yes, is it registered with the DEP Division of Water Supply?

   — —

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality

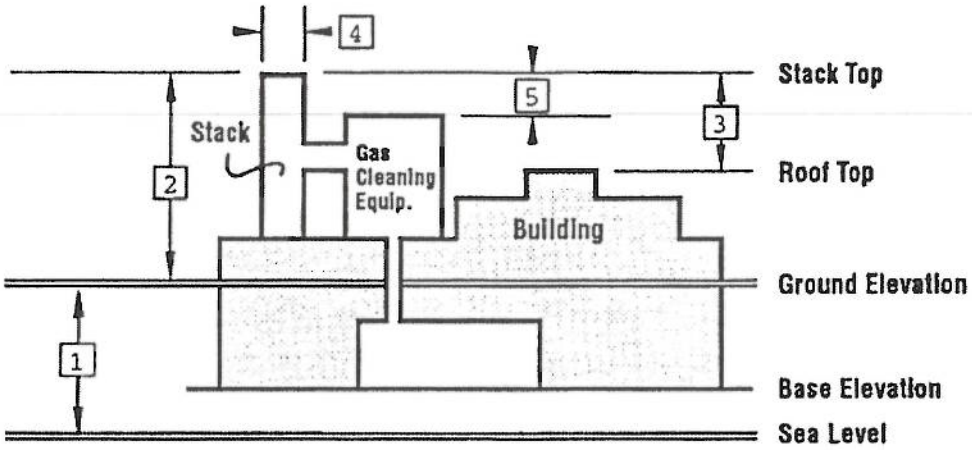
# BWP AQ CPA-3 (for use with BWP AQ 02, 03)

Comprehensive Plan Approval Application for Non Fuel Emissions

W213528
Transmittal Number

1191617
Facility ID (if known)

## I. Exhaust Stack Description




**Questions for the above diagram**

10ft.
1. Height of Ground Above Sea Level (arrow 1)

20ft.
2. Height of Stack Top above Ground (arrow 2)

5ft.
3. Height of Stack Top above Roof (arrow 3)

20in.
4. Stack Exit Size (inside) (arrow 4)

10ft.
5. Height of Stack Top above Control Equip. (arrow 5)

Vertical
6. Discharge direction (horizontal or vertical)

RTO Stack
7. Identify Stack Nos. as they appear on Process Schematic

Carbon Steel
8. Inside shell material

Carbon Steel
9. Outside Shell Material

0 to 81.6
10. Range of gas exit velocity (ft/sec)

Ambient to 160
11. Range of stack gas exit temp. (°F)

0 to 10,678
12. Range of stack gas volume (acfm)

None
13. Type of Rain Protection

The stack parameters will be evaluated to assure they provide sufficient protection from building, terrain, and stack tip downwash effects. Also, the "dew point" of the exhaust gases will be considered in the evaluation.

Note: The rain protection device should be of such a design as to allow the unimpeded escape of the stack gases. "Rain Hats" are prohibited.

## J. Standard Operating Procedure

Describe the start-up, operational, shutdown, and emergency procedures for the equipment that is integral to this project. The inscription must present, in sequence, the major steps that must be taken by the operator(s) to correctly and safely run the system. For each step, specify the duration and purpose, especially as it relates to maintaining safe operation and minimizing the emission of air contaminants. This inscription must detail the inter-relationship of the timing devices, the temperature indicators, the pressure indicators, the flow rate indicators, etc. **Specify which steps are under manual control and which are under automatic control**. Discuss the types, amounts, and duration of the release(s) of air contaminants during system fluctuations. Specify what measurements are observed and recorded to monitor performance. Use additional paper if necessary.

See Appendix B

## K. Standard Maintenance Procedure

Describe preventive maintenance procedures for this **entire system**. Include such items as cleaning, part replacement, scrubbing solution renewal/replacement schedules, method of leak testing, frequency of leak testing and/or effluent sampling to establish adequacy of control systems. Include Manufacturer's maintenance requirements. Each air pollution control device requires a separate and detailed maintenance procedure. You are required to keep organized records at the facility that will document the monitored operating parameters, and the history of maintenance activities for the most recent two-year period. Describe your proposed record keeping system. Use additional paper if necessary.

See Appendix B

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality

# BWP AQ CPA-3 (for use with BWP AQ 02, 03)

Comprehensive Plan Approval Application for Non Fuel Emissions

W213528
Transmittal Number

1191617
Facility ID (if known)

## L. Plans Application Preparer

1. Stephen Piper, P.E.
   Person who complied the plans application materials
2. M.J. Bradley & Associates, Inc.
   Representing
3. 1000 Elm Street, Second Floor, Manchester, NH 03101
   Address
4. 603-647-5746 ext 102
   Telephone number
5. April 7, 2008
   Date completed

## M. Certification

The seal and signature of a Massachusetts registered professional engineer must be entered below. This certifies that the information contained in this form has been checked for accuracy, and that the design represents good air pollution control engineering practice. (These must be originals. No photocopies, etc., of the seal and signature will be accepted.)

Stephen Piper
Print name

Authorized signature

COMMONWEALTH OF MASSACHUSETTS
STEPHEN G. PIPER
ENVIRONMENTAL
No. 36039
REGISTERED
PROFESSIONAL ENGINEER

M.J. Bradley & Associates, Inc.
Representing

4/11/08
Date

36039
PE number

Senior Project Manager
Position/title

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality Control

# BWP AQ SFC-5 (for use with BWP AQ 02, 03)

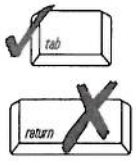
Supplemental Forms for Afterburners

W213528
Transmittal Number

1191617
Facility

## A. Plans Applications Requirements

**mportant:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.




This form is to be submitted together with Form BWP AQ CPA-3, prior to the modification or the installation of an **Afterburner**.

## B. Project Location

Chelsea Sandwich LLC
Name of facility

11 Broadway
Street/PO Box

| Chelsea | MA | 02150 |
|---|---|---|
| City/town | State | Zip code |

## C. Equipment Specifications

| Adwest Technologies | RETOX 9.0 RT095 |
|---|---|
| 1. Manufacturer | 2. Model number |

3. Is the unit, ☒ Thermal? ☐ Catalytic?

4. What is the capacity (SCFM) of the unit? 9,000

5. Give the combustion chamber dimensions:

| Square | 23.6 |
|---|---|
| a. What is the cross-sectional shape (round, square, etc)? | b. What is the cross-sectional area (sq. ft.)? |
| 22.7 | 535 |
| c. What is the chamber length (ft.)? | d. What is the effective chamber volume ($ft._3$)? |

6. Is there a pre-mixing chamber? ☒ Yes ☐ No

The ceramic beds that provide heat recovery as the air is reversed.
If yes, describe

7. Mixing occurs in the fume fan initially as well as the ceramic beds.
How is the combustion chamber designed to maximize mixing?

8. Give the following information for the catalytic unit:

Not Applicable
a. Give a brief description of the catalyst:

b. What are the dimensions of the bed?

| | | | |
|---|---|---|---|
| height (in.) | width (in.) | depth (in.) | weight (lbs.) |

9. Describe the afterburner's materials of construction:

| Silica / Alumina Media | 6 - Insulation |
|---|---|
| a. What is the type of refractory? | b. What is the thickness of the materials (in.)? |
| Plate | 10 |
| c. What is the shell material? | d. What is the expected life of the unit (yrs.)? |

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality Control

# BWP AQ SFC-5 (for use with BWP AQ 02, 03)

Supplemental Forms for Afterburners

W213528
Transmittal Number

1191617
Facility

## D. Fuel and Burner Data

1. List the burner manufacturer(s) and model numbers:

   Adwest Technologies — Manufacturer
   RETOX 9.0 RTO095 — Model number

2. What type of fuel is used?

   Natural Gas — natural gas, oil, other

   **Note:** fuel oil will be permitted only where natural gas is unavailable, only distillate fuel oil may be used if it is necessary to burn oil.

3. If gas is used, is it: ☒ Natural gas? ☐ Propane?

   a. What is the firing rate of the gas (cu. ft./hr.)? 2,584 cu ft/hr (Max) 0 (Min)

   b. What is the maximum heat input rate (Btu/hr)? 720,000

4. If fuel oil is used, indicate:

   Not Applicable — a. What is the type of oil?
   b. What is the % sulfur by weight?
   c. What is the maximum fuel firing rate (gal/hr)?
   d. What is the minimum fuel firing rate (gal/hr)?
   e. What is the maximum heat input rate (Btu/hour)?

5. What is the % excess combustion air? Combustion air in fume stream

6. Describe burner design and explain how proper mixing of fuel and combustion air is achieved:

   The RTO has natural gas injection at the collection fan inlet. Supplemental fuel is added to the fume stream, passes through the fan and is introduced to pre-heat the ceramic bed.

7. Describe burner modulation system (full modulating, high/low, on/off, etc.):

   NGI system is fully modulating to maintain the minimum destruction temperature.

8. If on/off modulation is used, explain how minimum operating temperature will be maintained at all times:

   Not Applicable

9. What portion of the contaminant stream will by-pass the burner to be mixed with the flame downstream?

   None. 100% of the stream passes through the heat exchangers and through the reaction chamber.

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality Control

# BWP AQ SFC-5 (for use with BWP AQ 02, 03)

Supplemental Forms for Afterburners

W213528
Transmittal Number

1191617
Facility

## E. Operating Parameters

1. Contaminant stream inlet flow rate: 9,300 ACFM, wet
2. Inlet moisture: Assume at 50% RH typical lbs./min.
3. Temperature at the afterburner inlet and outlet: 80 Inlet (°F); 280 Outlet (°F)
4. Static pressure at the inlet and outlet: Approx +14 Inlet – inches of water; Approx +0.5 Outlet - inches of water
5. If catalytic, pressure drop across the bed: Not Applicable inches of water
6. Outlet exhaust gas flow rate: 12,400 ACFM, wet
7. Minimum combustion temperature, as measured at the downstream end of the combustion: 1,500 °F

   Note: The burner must be able to maintain this minimum operating temperature without benefit of the heating value of contaminants in the waste stream.
8. Combustion chamber temperature control mechanism: Multiple thermocouples monitored by PLC
9. Minimum residence time of gases in the combustion chamber at the minimum: 1.0 Seconds; 1,500 (°F)

   Note: Design calculations must be submitted which incorporate fuel, air, and waste stream supply rates as well as heat transfer phenomenon (including heat recovery systems) in the determination of the minimum gas temperature and residence time in the combustion chamber.
10. Explain the design and operation of any heat recovery system associated with this afterburner system:

    There are ceramic beds at either end of the combustion chamber. Air flow is reversed every 3-5 min for heat recovery.
11. Attach a dimensioned plan(s) of the process and afterburner system. Indicate the location(s) of the burner(s), catalyst bed(s), bypass damper(s), bypass stack, and the normal stack. Clearly indicate the gas circulation pattern through preheat and burner chambers, and through heat recovery unit(s) prior to ambient discharge. Sampling ports for emission testing must also be indicated.
12. How many plans are attached? 4 (See Section 3)
13. Describe features of the system design and operation which will allow for emission testing using Department-sanctioned test methods:

    C/W 2, 4 inch FPT ports at 90 degrees located minimum 8 diameters from the stack inlet.

## F. Afterburner Operating Controls

1. List and explain all of the operating and safety controls associated with this system (include thermocouples and associated indicators/controlling pyrometers, interlock systems which prevent introduction of the waste stream until the afterburner achieves the minimum operating temperature, pilot flame detection devices, timing devices controlling purge of afterburner prior to burner ignition, high temperature limit controls, pressure switches to detect low fuel pressure or low air pressures, LEL monitors, bypass activation mechanisms, alarms, etc.). (Use a separate sheet of paper if necessary.)

   See Appendix B

2. Explain the typical process fluctuations such as changes in process rate, effluent temperatures, flow rates, fume concentrations, etc., which may affect operation of the unit. Also explain the means by which control efficiency will be maintained throughout these fluctuations:

   See Appendix B

3. What are the emergency procedures during system upsets?

   See Appendix B

## G. Emissions Data

**The Applicant Must Provide Detailed Information on the Presence of the Following Substances in the Contaminated Gas Stream:** chlorines, other halogens, sulfur, heavymetals, asbestos.

1. Indicate the maximum gaseous emission rate:

| | **Chemical Name** | **Before Control** (lbs./hr) | **After Control** (lbs./hr) | **After Control** (ppm by volume) |
|---|---|---|---|---|
| a. | VOC | 66 | 0.63 | 20 |
| b. | TRS | 0.24 | 0.002 | 0.1 |
| c. | | | | |

## G. Emissions Data (cont.)

2. Indicate the maximum particulate emissions rate:

| Chemical Name | Before Control (lbs./hr) | After Control (lbs./hr) | After Control (ug/DSCM) |
|---|---|---|---|
| Not Applicable<br>a. | | | |
| b. | | | |
| c. | | | |
| d. | | | |

3. Indicate how the above emission rates were obtained, and attach appropriate calculations and documentation:

VOC and TRS based on test data.

4. What is the capture efficiency of the ventilation systems serving the afterburner?

90 for truck loading, 95 for tank vents
%

Estimated based on design
And how was this calculated or determined?

5. What is the destruction efficiency of organic compounds (as carbon) in the afterburner?

99.0
%

Vendor guarentee
And how was this calculated or determined?

## H. Catalytic Units Only

1. Estimated useful life of the catalyst: Not Applicable
2. How will catalyst performance be monitored?
3. Will the used catalyst be treated for re-use? ☐ Yes ☐ No
4. If not, how will it be disposed of?
5. Is the used catalyst subject to 310 CMR 30.000 pertaining to Hazardous Waste? ☐ Yes ☐ No
6. If yes, identify the disposal agency:

License number

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality Control

# BWP AQ SFC-5 (for use with BWP AQ 02, 03)

Supplemental Forms for Afterburners

W213528
Transmittal Number

1191617
Facility

## I. Failure Notification

1. How is the failure of the collection device made known to the operator (e.g. audible alarm, lights, etc.)?

   Audible alarm representing fan failure

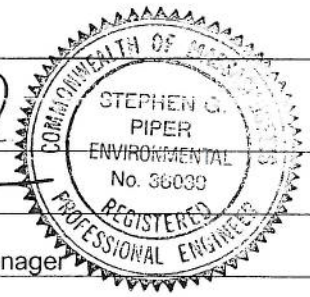
   Local inlet gauges confirm capture system airflow

   See Appendix B

2. Describe the record keeping procedures to be used in identifying the cause, duration, and resolution of each failure (use a separate page if necessary):
   Operator Log Book

## J. Certification

The seal and signature of a Massachusetts Registered Professional Engineer must be entered below. This certifies that the information contained in this form has been checked for accuracy, and that the design represents good air pollution control engineering practice. (These must be originals; no photocopies, etc. of the seal and signature will be accepted.)




Stephen Piper
Print name

Authorized signature

Senior Project Manager
Position/title

M.J. Bradley & Associates, Inc.
Representing

4/11/08
Date

36039
PE number

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality Control

# BWP AQ SFC-7 (for use with BWP AQ CPA-1 through BWP AQ CPA-5)

W213528
Transmittal Number

1191617
Facility

## Determination of Best Available Control Technology

**Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



## A. Applicability

Complete this form only if specifically requested to do so by the Department. Do not complete this without first consulting with the regional office. This form is not a requirement of all applicants. This form is intended as a supplement to forms BWP AQ CPA-1 through BWP AQ CPA-5 where the applicant is required to demonstrate that the source will utilize Best Available Control Technology (BACT) for the emission of a pollutant. This analysis utilizes the "top-down" approach to determination of BACT.

For additional guidance on the determination of BACT, refer to the June 1991 NESCAUM BACT GUIDELINE, attached to this form.

## B. General

Chelsea Sandwich LLC
Facility name

11 Broadway Chelsea, MA 02150
Location

## C. Pollutants

For the process under review, list each pollutant or class of pollutant that will be emitted and the **baseline (uncontrolled)** emission rate. These values should agree with values provided on CPA or other forms filed with this application.

| Pollutant | Uncontrolled Emission Rate | |
|---|---|---|
| | Pounds per Hour* | Tons per Year** |
| Sulfur Dioxide ($SO_2$): | See Section 5 | |
| Nitrogen Oxides ($NO_x$): | | |
| Carbon Monoxide (CO): | | |
| Lead (Pb): | | |
| Particulates (PM): | | |
| Volatile Organic Compounds (VOC): | | |
| Other Pollutants (list): | | |
| 1. | | |
| 2. | | |
| 3. | | |

*Pounds per hour is the maximum emission rate possible for the process.

**Tons per year is calculated from pounds per hour operating 8760 hours per year unless otherwise restricted (i.e. by a federally enforceable limit or permit on operation or production).

## Determination of Best Available Control Technology

## D. Control Options

List, in order of resulting emission rates (1 = lowest, 6 = highest), all air pollution control measures and/or devices which would result in a lower emission rate than that of the project, as proposed. Do not, at this time, eliminate from consideration any options because of economics, technical or other considerations. See the last page of this form (section J) for some examples of control options; it is not, however, a comprehensive list.

**You must include:**

- technology required by any regulations;
- technology that is in use on similar types of sources (existing control technology);
- technology that is in use on other types of sources but not yet demonstrated specifically on your source (technology transfer);
- theoretically applicable technology but as yet unproven on full scale installations;
- add-on control equipment;
- process modifications that will reduce emissions;
- alternative raw materials; and
- alternative fuels.

| | **Control Description** | **Emission Rate After Controls (pounds per hour)** | | |
|---|---|---|---|---|
| | | Pollutant 1* | Pollutant 2* | Pollutant 3* |
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |

*Indicate pollutant

**Determination of Best Available Control Technology**

## E. Option Feasibility

For each control option listed above, indicate the reason for not utilizing the option in this project and whether or not the technology has been demonstrated in use by a similar source.

| Control Option | Basis of Elimination | | | Demonstrated in Use | |
|---|---|---|---|---|---|
| | Economic | Technical | Other | Yes | No |
| 1. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 5. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. | ☐ | ☐ | ☐ | ☐ | ☐ |

* Indicate Pollutant

## F. Documentation

For each basis of elimination checked in section E on the previous page, provide a detailed explanation or calculation to substantiate the elimination of the control option. The substantiation shall include those items as delineated below:

**Technical:** Elimination based on technical grounds must specifically state the reason the technology is not feasible and why the system cannot be modified to accommodate the source. If the technology is in use on other sources, the difference prohibiting its use on this source must be stated in detail. Do not use cost or other qualifications in the technical documentation. **Be as specific and technical as possible.**

**Economic:** Elimination based on economic (cost of the control) must complete the Cost Analysis work sheet, section I. Approximations/estimates may be used as necessary. However, in the event that the Department does not concur with provided estimates, final determination of cost will be based on procedures outlined in the OAQPS Control Cost Manual (EPA Document 450/3-90-006) or other methods approved by the Department.

**Other:** Elimination based on other considerations must specifically state the reason the option is not feasible and why the system cannot be modified to accommodate this option. **Be as specific and detailed as possible.**

## Determination of Best Available Control Technology

## G. Additional Impacts

Describe other factors, beneficial and adverse, associated with the project and/or control option as appropriate. Include items such as:

Environmental Impacts – Describe environmental factors other than mass emissions to the air that are relevant, such as:

- visible emissions
- odor
- toxicity of emissions
- noise
- safety

Energy Impacts – Describe factors such as:

- energy consumption of different options
- impact of alternative fuel use

Impact on other media - Describe cross media impacts, such as:

- water pollution
- water supply
- solid waste
- hazardous waste, etc.

## H. BWP SFC – 7 Preparer

Stephen Piper, PE
Name

M.J. Bradley & Associates
Company

1000 Elm St. Second Floor
Address

| Manchester | NH | 03101 |
|---|---|---|
| City/town | State | Zip code |

| 603-647-5746 ext. 102 | April 11, 2008 |
|---|---|
| Telephone number | Date |

## I. Cost Analysis Work Sheet

**Total Capital Investment (TCI)**

### Direct Purchase Cost

| 1. Primary control device auxiliary equipment | 2. Fans |
|---|---|
| 3. Ducts | 4. Other |
| 5. Instrumentation/controls | |

### Indirect Capital Cost

| 6. Construction | 7. Labor |
|---|---|
| 8. Sales taxes* | 9. Freight charges |

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality Control

# BWP AQ SFC-7 (for use with BWP AQ CPA-1 through BWP AQ CPA-5)

W213528
Transmittal Number

1191617
Facility

## Determination of Best Available Control Technology

## I. Cost Analysis Work Sheet (cont.)

### Engineering/Planning

10. Contracting fees

11. Testing

12. Supervision

13. Total capital investment (add items 1 – 12)

14. Annualized capital cost
$C[i(1+i)^n]/[(1+i)^n - 1]$
i = interest rate (assume 10%)
n = life of equipment (assume 10 years or less)*
C = Total Capital Investment (line 13)

### Annual Operating and Maintenance Cost

### Direct Operating Cost

15. Labor

16. Maintenance

17. Replacement parts

### Indirect Cost

18. Property taxes*

19. Insurance

20. Fees

21. Total annual operating costs (add items 15 – 20)

### Energy Cost

22. Annual electrical energy expense

23. Annual auxiliary fuel

24. Total annual energy cost ( item 22 + 23)

25. Annual waste treatment and disposal costs

26. Miscellaneous annual expenses

27. Annual recourse recovery & resale

28. Total annualized control costs
(items 14+21+25+26)-27

29. Amount of pollutant controlled over Baseline Emissions
(Tons per year)

30. Cost of control ($/ton) (divide 28 by 29)

*State and federal law may provide for certain tax exemptions and special loans for the purchase of control equipment. Contact the Massachusetts Industrial Finance Agency (MIFA) or Federal Small Business Association (SBA).

## Determination of Best Available Control Technology

## J. Control Options (Partial list)

### ADD-ON CONTROLS

- Thermal Incinerators
- Catalytic Incinerators
- Fabric Filters/Baghouses
- Cyclones
- Electrostatic Precipitators
- Condenser/Refrigeration Systems
- Wet Scrubbers:
  - Packed Bed
  - Spray Chamber
  - Other
- Carbon Adsorbers
- Other Media Adsorbers
- Dry Scrubbers
- Flares
- Non-Regenerative Carbon
- Biofilters/Soil Filters
- Non-Selective Catalytic Reduction
- Selective Catalytic Reduction
- Afterburners
- Other Add-on Control Devices

### PROCESS MODIFICATION

- Reformulation of Raw Materials
- Use of Non-Hazardous/Non-Toxic Alternatives
- Combustion Controls
- Alternate Processing Techniques
- Electrostatic Spray Application
- High Volume Low Pressure (HVLP) Spray Application
- Recycling/Waste Minimization
- Alternative Fuels
- Powder Coating
- Aqueous Cleaning Compounds
- Other Process Changes

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality

# BWP AQ SFP-3 (for use with BWP AQ 02, 03)

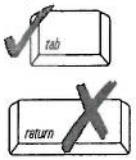
Supplemental Form for Survey of Noise Potential

W213528
Transmittal Number

1191617
Facility

## A. Plans Application Requirements

**Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.




This form is to be submitted together with BWP AQ CPA 03 and BWP AQ CPA 01, *prior* to the modification or the installation of equipment (such as diesel engines, electric generators, or turbines) which has the potential to cause a noise nuisance condition, or a submittal in response to a Department **Notice of Noncompliance** citing a noise nuisance condition.

## B. Noise Source

1. Description:

   RTO – See Section 2 and Appendix D

2. Indicate operating schedule:

   a. hours/day

   b. days/week

   c. weeks/year

3. Comments:

## C. Noise Abatement Equipment

1. Manufacturer

   Model number

2. Describe type, location, performance characteristics:

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality

# BWP AQ SFP-3 (for use with BWP AQ 02, 03)

Supplemental Form for Survey of Noise Potential

W213528
Transmittal Number

1191617
Facility

## D. Full Octave Band Analysis

The following community noise profiles will require the use of sound pressure level measuring equipment in the neighborhood of the installation.

1. Lowest **Ambient** Sound Pressure Levels During Operating Hours of Noise Source.

   a. At property line:

| "A" Weighted | 31.5 | 63.0 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

   b. At the nearest inhabited building:

| "A" Weighted | 31.5 | 63.0 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

   The following noise profiles are required only for a submittal in response to a department **Notice of Noncompliance** citing a noise nuisance condition. Applications for new equipment can skip this section and go ahead to section D3.

2. Neighborhood Sound Pressure Levels with Source Operating without Abatement Equipment.

   a. At property line:

| "A" Weighted | 31.5 | 63.0 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

## D. Full Octane Band Analysis (cont.)

b. At the nearest inhabited building:

| "A" Weighted | 31.5 | 63.0 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

3. **Expected** Neighborhood Sound Pressure Levels after Installation of Noise Abatement Equipment.

a. At property line:

| "A" Weighted | 31.5 | 63.0 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

b. At nearest inhabited building:

| "A" Weighted | 31.5 | 63.0 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | 16K |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Note: The Department may request that actual measurements be taken after the installation of the noise abatement equipment to verify compliance.

**Massachusetts Department of Environmental Protection**
Bureau of Waste Prevention – Air Quality

# BWP AQ SFP-3 (for use with BWP AQ 02, 03)

Supplemental Form for Survey of Noise Potential

W213528
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Facility

## E. Manufacturer's Noise Profile on New Equipment

The applicant must attach the manufacturer's noise generation data for the equipment being proposed for installation. This data must specify the sound pressure levels for a complete 360° turn around the equipment, and at various distances from the equipment.

## F. Plot Plan

The plot plan required in form BWP AQ CPA 01 and BWP AQ CPA 03 must include location of the noise source(s) and the distances from the source(s) to the property lines and the nearest inhabited residences, as well as indications of possible future construction areas.

## G. Community Sound Level Criteria

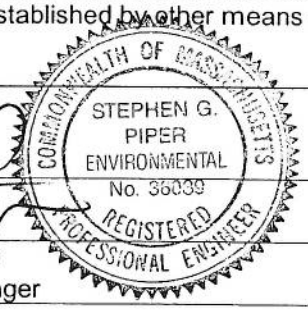
Approval of the proposed new equipment or proposed corrective measures will not be granted if the installation:

1. Increases broadband sound level by more than 10dB (A).
2. Produces a "pure tone" condition – when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 decibels or more.
3. Creates a potential condition of air pollution as defined in 310 CMR 7.01.

Note: These criteria are measured both at the property line and at the nearest inhabited residence. Ambient is defined as the background A-Weighted sound pressure level that is exceeded 90% of the time measured during equipment operating hours. The ambient may also be established by other means with the consent of the department.

## H. Certification

The seal and signature of a Massachusetts Registered Professional Engineer must be entered below. This certifies that the information contained in this form has been checked for accuracy, and that the design represents good air pollution control engineering practice. (These must be originals. No photocopies, etc., of the seal and signature will be accepted.)




Stephen Piper
Print name

Authorized signature

Sr. Project Manager
Position/title

M. J. Bradley & Associates
Representing

4/11/08
Date

36039
P.E.#

# 5 BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

Chelsea-Sandwich LLC requested a pre-application meeting with DEP NERO in order to obtain a preliminary indication on the approvability of the proposed RTO emission control device for control of residual oil tanks and truck loading at the Chelsea Terminal. At the pre-application meeting Ed Braczyk of DEP indicated that an RTO rated for 99% VOC destruction would be considered BACT.

Regarding the capture of emissions, it was explained that the emissions capture system for the residual oil tanks was rated for 95% and that the emissions capture system for the residual oil truck loading was rated 90% capture. Ed Braczyk acknowledged that the tank vents and the truck loading operations were not conducive to 100% capture. Due to the safety requirements associated with operation of a petroleum storage tank, the capture system cannot be tight fitting as there cannot be a risk of under pressurizing or over pressurizing the tanks (resulting in tank collapse and catastrophic spill). In the case of the truck loading, the capture system cannot interfere with the top loading nozzle or the operator's view of the liquid level in the truck.

Because the control of emissions from residual oil tanks and residual truck loading is not common to the bulk terminal industry, Ed Braczyk indicated that this Non-Major CPA application would not require a top-down discussion of all control alternatives. In summary, Ed concurred the use of a 90 to 95% capture system for vents on the residual oil tanks and residual oil truck loading and a RTO control system rated for 99% VOC destruction would be approvable as BACT.

In the event that the RTO is only receiving a fraction of emissions based on operational slowdowns, the ability to demonstrate 99% reduction could be limited by the sensitivity of the test method. Based on the projected potential VOC emissions going to the RTO from the residual oil storage tanks and the residual oil truck loading, the RTO outlet hourly emission rate will not exceed 0.63 lb/hour.

# 6 RECORDKEEPING AND REPORTING PROCEDURES

To ensure compliance with the proposed limitations, Chelsea Sandwich LLC proposes to maintain records of the operation of the RTO by tracking (recording) the operating temperature of the unit as a means to demonstrate that the unit is meeting the 99% destruction efficiency guarantee. Monthly product throughput records will be maintained through receipt and sales data as a means to track compliance with the 12-month rolling annual emission limits. Because the product throughputs are directly related to the emissions, it will not be necessary to recalculate emissions every month. Emission inventory reports will be submitted to DEP as required in 310 CMR 7.12. The following provides a summary of the specific records and assumptions that will be maintained by Chelsea-Sandwich Terminal.

## 6.1 Combustion Emissions

For the RTO, the products of combustion emissions will be calculated based on vendor guaranteed emissions rates for NOx of 3 ppm for CO of 50 ppm. Emissions of PM, CO and SO2 for the RTO will be calculated based on AP-42 emission factors and the quantity of natural gas used as metered for billing purposes. See the calculation worksheet (see Appendix A).

For the boilers, the products of combustion emissions will be calculated based on AP-42 emission factors and the quantity of fuel fired. See the calculation worksheet (see Appendix A).

## 6.2 VOC Emissions

The VOC emissions (after control) will be well below the 50 tpy major source threshold. The calculation of facility-wide VOC emissions is provided in Appendix A and incorporates a combination of AP-42 emission factors and adjusted factors based on test results showing higher than AP-42 factors for residual oil truck loading and residual oil storage tanks. Chelsea Sandwich LLC will maintain a record of product throughputs to demonstrate that the 12-month rolling total is less than the product throughputs used to calculate potential VOC emissions and facility-wide emissions are therefore less than 50 tons.

# APPENDIX A

# EMISSION CALCULATIONS

| Unit ID# | Unit Description | Rating | | Fuel | Potential Emissions (TPY) VOC | $NO_x$ | $SO_2$ | CO | PM | PM10 | PM2.5 | NH3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 - 1 | Boiler | 12 | MMBTU/hr | #6 Oil | 0.396 | 19.272 | 27.506 | 1.752 | 2.738 | 1.685 | 0.626 | 0.280 |
| 1 - 2 | Boiler | 9.86 | MMBTU/hr | #6 Oil | 0.325 | 15.835 | 22.601 | 1.440 | 2.250 | 1.384 | 0.514 | 0.230 |
| 1 - 3 | RTO | | | NG | 0.017 | 0.848 | 0.236 | 8.601 | 0.024 | 0.024 | 0.024 | n/a |
| Unit ID# | Unit Description | | Material Processed | | | | | | | | | |
| 2 - 2 | Residual Truck Loading Rack | | Residual (After Control) | | 3.535 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 2 - 2 | Distillate Truck Loading Rack | | Distillates | | 6.870 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 2 - 3 | Barge Loading | | Distillates/Residual | | 1.595 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Unit ID# | Unit Description | Storage Cap. (gal) | Current Contents | | | | | | | | | |
| 4 - 101 | AST Vertical Fixed | 840,000 | No. 2 Oil | | 0.77 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 102 | AST Vertical Fixed | 840,000 | No. 6 Oil | | * | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 103 | AST Vertical Fixed | 840,000 | No. 6 Oil | | * | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 104 | AST Vertical Fixed | 840,000 | No. 6 Oil | | * | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 105 | AST Vertical Fixed | 840,000 | No. 2 Oil | | 0.77 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 106 | AST Vertical Fixed | 840,000 | No. 6 Oil | | * | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 107 | AST Vertical Fixed | 504,000 | LSD | | 0.46 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 108 | AST Vertical Fixed | 840,000 | No. 2 Oil | | 0.77 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 109 | AST Vertical Fixed | 840,000 | LSD | | 0.77 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 110 | AST Horiz Fixed | 30,000 | Fuel Add | | 0.10 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 111 | AST Horiz Fixed | 30,000 | Fuel Add | | 0.51 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 115 | AST Horiz Fixed | 30,000 | Slop | | 0.08 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 114 | AST Horiz Fixed | 4,000 | Fuel Add | | 0.00 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 116 | AST Horiz Fixed | 5,200 | LSD | | 0.00 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 117 | AST Horiz Fixed | 3,000 | Fuel Add | | 0.00 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 201 | AST Vertical Fixed | 4,200,000 | No. 2 Oil | | 2.21 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 202 | AST Vertical Fixed | 5,040,000 | No. 6 Oil | | * | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 203 | AST Vertical Fixed | 3,150,000 | No. 6 Oil | | * | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 204 | AST Vertical Fixed | 3,990,000 | No. 6 Oil | | * | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - 205 | AST Vertical Fixed | 5,040,000 | No. 2 Oil | | 2.53 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - BH1 | AST Horiz Fixed | 1,000 | No. 6 Oil | | 0.00 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 4 - BH2 | AST Horiz Fixed | 1,000 | No. 6 Oil | | 0.00 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| *Total for 7 No. 6 Oil Tanks | | | | | 15.40 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | | | **Total** | | **37.105** | **35.955** | **50.343** | **11.792** | **5.012** | **3.093** | **1.164** | **0.511** |

* *These tanks are summarized above as Total for 7 No. 6 Oil Tanks.*

| Unit ID# | Unit Description | Potential Emissions (TPY) Benzene | Ethylbenzene | Isooctane | n-Hexane | Toluene | Xylene | Total Hap |
|---|---|---|---|---|---|---|---|---|
| 1 - 1 | Boiler | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1 - 2 | Boiler | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1 - 3 | RTO | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Unit ID# | Unit Description | | | | | | | |
| 2 - 2 | Residual Truck Loading Rack After Control | 0.2855 | 0.0301 | 0.0000 | 0.0213 | 0.1679 | 0.1010 | 0.6058 |
| 2 - 2 | Distillate Truck Loading Rack | 0.5339 | 0.0572 | 0.0000 | 0.0498 | 0.3170 | 0.1922 | 1.1501 |
| 2 - 3 | Barge Loading Distillate/Residual | 0.1243 | 0.0133 | 0.0000 | 0.0114 | 0.0737 | 0.0447 | 0.2674 |
| Unit ID# | Unit Description | | | | | | | |
| 4 - 101 | Vertical Fixed | 0.0016 | 0.0024 | 0.0000 | 0.0003 | 0.0181 | 0.0447 | 0.0672 |
| 4 - 102 | Vertical Fixed | * | * | * | * | * | * | * |
| 4 - 103 | Vertical Fixed | * | * | * | * | * | * | * |
| 4 - 104 | Vertical Fixed | * | * | * | * | * | * | * |
| 4 - 105 | Vertical Fixed | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 4 - 106 | Vertical Fixed | * | * | * | * | * | * | * |
| 4 - 107 | Vertical Fixed | 0.0010 | 0.0014 | 0.0000 | 0.0002 | 0.0108 | 0.0267 | 0.0401 |
| 4 - 108 | Vertical Fixed | 0.0016 | 0.0024 | 0.0000 | 0.0003 | 0.0181 | 0.0447 | 0.0672 |
| 4 - 109 | Vertical Fixed | 0.0016 | 0.0024 | 0.0000 | 0.0003 | 0.0181 | 0.0447 | 0.0672 |
| 4 - 110 | Horiz Fixed | 0.0002 | 0.0002 | 0.0000 | 0.0000 | 0.0018 | 0.0045 | 0.0068 |
| 4 - 111 | Horiz Fixed | 0.0008 | 0.0012 | 0.0000 | 0.0002 | 0.0092 | 0.0228 | 0.0343 |
| 4 - 115 | Horiz Fixed | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0003 |
| 4 - 114 | Horiz Fixed | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.0018 | 0.0045 | 0.0067 |
| 4 - 116 | Horiz Fixed | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0002 | 0.0002 |
| 4 - 117 | Horiz Fixed | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 |
| 4 - 201 | Vertical Fixed | 0.0046 | 0.0069 | 0.0000 | 0.0009 | 0.0518 | 0.1284 | 0.1927 |
| 4 - 202 | Vertical Fixed | * | * | * | * | * | * | * |
| 4 - 203 | Vertical Fixed | * | * | * | * | * | * | * |
| 4 - 204 | Vertical Fixed | * | * | * | * | * | * | * |
| 4 - 205 | Vertical Fixed | 0.0053 | 0.0079 | 0.0000 | 0.0011 | 0.0594 | 0.1471 | 0.2207 |
| 4 - BH1 | Horiz Fixed | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 4 - BH2 | Horiz Fixed | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| *Total for 7 No. 6 Oil Tanks | | 1.2400 | 0.1300 | 0.0000 | 0.0900 | 0.7300 | 0.7300 | 2.9200 |
| | **Total** | **2.200** | **0.256** | **0.000** | **0.176** | **1.478** | **1.537** | **5.647** |

* *These tanks are summarized above as Total for 7 No. 6 Oil Tanks*

# Chelsea Sandwich LLC
# Chelsea, Massachusetts

| ID# | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 |
|---|---|---|---|---|---|---|---|---|
| Type | AST | AST | AST | AST | AST | AST | AST | AST |
| Type 2 | Vertical Fixed | Vertical Fixed | Vertical Fixed | Vertical Fixed | Vertical Fixed | Vertical Fixed | Vertical Fixed | Vertical Fixed |
| diameter | 60 | 60 | 60 | 60 | 60 | 60 | 48 | 60 |
| height | 40 | 40 | 40 | 40 | 40 | 40 | 36 | 40 |
| const. | steel | steel | steel | steel | steel | steel | steel | steel |
| capacity | 840,000 | 840,000 | 840,000 | 840,000 | 840,000 | 840,000 | 504,000 | 840,000 |
| pot. turns | 300.0 | 300.0 | 180.0 | 11.8 | 300.0 | 12.9 | 300.0 | 300.0 |
| pot. thru | 252,000,000 | 252,000,000 | 151,200,000 | 9,953,217 | 252,000,000 | 10,815,030 | 151,200,000 | 252,000,000 |
| avg fill | 20 | 20 | 20 | 20 | 20 | 20 | 18 | 20 |
| shell lining | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| roof color | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray |
| cond. | good | good | good | good | good | good | good | good |
| shell color | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray |
| cond. | good | good | good | good | good | good | good | good |
| roof type | cone | cone | cone | cone | cone | cone | cone | cone |
| deck type | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| No. Columns | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| cone ht. | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| dome rad. | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| cone slope | 0.0667 | 0.0667 | 0.0667 | 0.0667 | 0.0667 | 0.0667 | 0.0667 | 0.0667 |
| V.V. | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 |
| P.V. | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| pot. cont. | No. 2 Oil | No. 6 Oil | No. 6 Oil | No. 6 Oil | No. 2 Oil | No. 6 Oil | LSD | 2 Oil |
| primary seal | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| seconday seal | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| deck type | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| fittings | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | | | | | | | | |

# Chelsea Sandwich LLC
# Chelsea, Massachusetts

| ID# | 109 | 110 | 111 | 115 | 114 | 116 | 117 | 201 |
|---|---|---|---|---|---|---|---|---|
| Type | AST | AST | AST | AST | AST | AST | AST | AST |
| Type 2 | Vertical Fixed | Horiz Fixed | Horiz Fixed | Horiz Fixed | Horiz Fixed | Horiz Fixed | Horiz Fixed | Vertical Fixed |
| diameter | 60 | 12 | 12 | 12 | 8 | 8 | 5 | 120 |
| height | 40 | 35 | 35 | 35 | 10 | 13 | 18 | 60 |
| const. | steel | steel | steel | steel | steel | steel | steel | steel |
| capacity | 840,000 | 30,000 | 30,000 | 30,000 | 4,000 | 5,200 | 3,000 | 4,200,000 |
| pot. turns | 300.0 | 1300.0 | 1300.0 | 1300.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| pot. thru | 252,000,000 | 39,000,000 | 39,000,000 | 39,000,000 | 200,000 | 260,000 | 150,000 | 210,000,000 |
| avg fill | 20 | 18 | 18 | 18 | 5 | 7 | 9 | 30 |
| shell lining | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| roof color | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray |
| cond. | good | good | good | good | good | good | good | good |
| shell color | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray |
| cond. | good | good | good | good | good | good | good | good |
| roof type | cone | cone | cone | cone | cone | cone | cone | cone |
| deck type | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| No. Columns | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| cone ht. | 2 | 0.5 | 0.5 | n/a | n/a | n/a | n/a | 4 |
| dome rad. | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| cone slope | 0.0667 | 0.0833 | 0.0833 | n/a | n/a | n/a | n/a | 0.0667 |
| V.V. | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 |
| P.V. | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| pot. cont. | LSD | Fuel Add | Fuel Add | Slop | Fuel Add | LSD | Fuel Add | No. 2 Oil |
| primary seal | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| seconday seal | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| deck type | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| fittings | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | | | | | | | | |

# Chelsea Sandwich LLC
# Chelsea, Massachusetts

| ID# | 202 | 203 | 204 | 205 | BH1 | BH2 |
|---|---|---|---|---|---|---|
| Type | AST | AST | | AST | | AST |
| Type 2 | Vertical Fixed | Vertical Fixed | Vertical Fixed | Vertical Fixed | Horiz Fixed | Horiz Fixed |
| diameter | 120 | 92 | 103 | 120 | 4 | 4 |
| height | 60 | 64 | 64 | 60 | 11 | 11 |
| const. | steel | steel | steel | steel | steel | steel |
| capacity | 5,040,000 | 3,150,000 | 3,990,000 | 5,040,000 | 1,000 | 1,000 |
| pot. turns | 12.4 | 9.9 | 15.7 | 50.0 | 400.0 | 400.0 |
| pot. thru | 62,635,483 | 31,221,666 | 62,452,930 | 252,000,000 | 400,000 | 400,000 |
| avg fill | 30 | 32 | 32 | 30 | 6 | 6 |
| shell lining | n/a | n/a | n/a | n/a | n/a | n/a |
| roof color | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray |
| cond. | good | good | good | good | good | good |
| shell color | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray | Med. gray |
| cond. | good | good | good | good | good | good |
| roof type | cone | cone | cone | cone | cone | cone |
| deck type | n/a | n/a | n/a | n/a | n/a | n/a |
| No. Columns | n/a | n/a | n/a | n/a | n/a | n/a |
| cone ht. | 4 | 3 | 3.5 | 4 | n/a | n/a |
| dome rad. | n/a | n/a | n/a | n/a | n/a | n/a |
| cone slope | 0.0667 | 0.06522 | 0.06796 | 0.0667 | n/a | n/a |
| V.V. | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 |
| P.V. | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| pot. cont. | No. 6 Oil | No. 6 Oil | No. 6 Oil | No. 2 Oil | No. 6 Oil | No. 6 Oil |
| primary seal | n/a | n/a | n/a | n/a | n/a | n/a |
| seconday seal | n/a | n/a | n/a | n/a | n/a | n/a |
| deck type | n/a | n/a | n/a | n/a | n/a | n/a |
| fittings | n/a | n/a | n/a | n/a | n/a | n/a |
| | | | | | | |

Chelsea Sandwich LLC
Process Calculation Sheet

Process ID#: 1-1
Boiler #1 — 12.000 MMBTU/hr
AP-42 Emission Factors*
#6 Oil combustion/Commercial — 150,000 BTU/gal for #6 Oil 0.5% S

| | | |
|---|---|---|
| PM | 7.82 | lb/1000 gallon |
| CO | 5.0 | lb/1000 gallon |
| $SO_2$ | 78.5 | lb/1000 gallon |
| $NO_x$ | 55.0 | lb/1000 gallon |
| VOC | 1.130 | lb/1000 gallon, non-methane |
| PM2.5 | 1.786 | lb/1000 gallon |
| PM10 | 4.808 | lb/1000 gallon |
| NH3 | 0.800 | lb/1000 gallon** |

Potential hours per year: 8,760

*Table 1.3-1 Criteria Pollutant Emission Factors for Fuel Oil Combustion and
Table 1-3.3 Emission Factors for Total Organic Compounds (9/98) and
Table 1.3-7 Cumulative Particle Size Distribution
**Provided by DEP 1/17/03

Calculations

Max lbs/hr = Total MMBTU/hr * emission factor / (150,000 BTU/gal * 1,000,000) /1000
Potential TPY = Max lb/hr * potential hours / 2000 lb/ton

| Criteria Pollutants | Pot lb/hr | Pot TPY |
|---|---|---|
| Particulate Matter | 0.63 | 2.738 |
| Carbon Monoxide | 0.40 | 1.752 |
| Sulfur Dioxide | 6.28 | 27.506 |
| Nitrogen Dioxide | 4.40 | 19.272 |
| Volatile Organic Compounds | 0.09 | 0.396 |
| Particulate Matter 2.5 | 0.14 | 0.626 |
| Particulate Matter 10 | 0.38 | 1.685 |
| Ammonia | 0.06 | 0.280 |

Chelsea Sandwich LLC
Process Calculation Sheet

Process ID#: 1-2
Boiler #2 — 9.860 MMBTU/hr
AP-42 Emission Factors
#6 Oil combustion/Commercial — 150,000 BTU/gal for #6 Oil 0.5% S

| | | |
|---|---|---|
| PM | 7.82 | lb/1000 gallon |
| CO | 5.0 | lb/1000 gallon |
| $SO_2$ | 78.5 | lb/1000 gallon |
| $NO_x$ | 55.0 | lb/1000 gallon |
| VOC | 1.130 | lb/1000 gallon, non-methane |
| PM2.5 | 1.786 | lb/1000 gallon |
| PM10 | 4.808 | lb/1000 gallon |
| NH3 | 0.800 | lb/1000 gallon** |

Potential hours per year: 8,760

*Table 1.3-1 Criteria Pollutant Emission Factors for Fuel Oil Combustion and
Table 1-3.3 Emission Factors for Total Organic Compounds (9/98)
Table 1.3-7 Cumulative Particle Size Distribution
**Provided by DEP 1/17/03

Calculations

Max lbs/hr = Total MMBTU/hr * emission factor / (150,000 BTU/gal * 1,000,000) /1000
Potential TPY = Max lb/hr * potential hours / 2000 lb/ton

| Criteria Pollutants | Pot lb/hr | Pot TPY |
|---|---|---|
| Particulate Matter | 0.51 | 2.250 |
| Carbon Monoxide | 0.33 | 1.440 |
| Sulfur Dioxide | 5.16 | 22.601 |
| Nitrogen Dioxide | 3.62 | 15.835 |
| Volatile Organic Compounds | 0.07 | 0.325 |
| Particulate Matter 2.5 | 0.12 | 0.514 |
| Particulate Matter 10 | 0.32 | 1.384 |
| Ammonia | 0.05 | 0.230 |

**Chelsea Sandwich LLC**
**Process Calculation Sheet**

Organic Liquid (<1.5 psi) Barge Loading

| Emission factor | Distillate Throughput | Potential gal/yr |
|---|---|---|
| 0.0130 lb/$10^3$ gal * | Kerosene | 10,000,000 |
| 0.0120 lb/$10^3$ gal * | Distillates | 60,000,000 |
| 0.03900 lb/$10^3$ gal ^ | Residual Oil | 60,000,000 |

* AP-42 5.2-6 Total Organic Emission Factors
for Petroleum Marine Vessel Sources (1/95)
^ Reflects 433 times the AP-42 factor of .00009 lb/$10^3$ gal based on testing at the Truck Rack

Max lbs/hr = Total gallons/hr * potential emission factor
Potential TPY = Max lb/hr * potential hours / 2000 lb/ton

8,760 Potential Hours/year

Kero 0.065 Pot Tpy

NMVOC 1.595 Pot Tpy

Dist 0.360 Pot Tpy

Res 1.170 Pot Tpy

HAP Vapor Weight Percents[1]

| | Distillate/Residual* | Kerosene |
|---|---|---|
| Benzene | 8.06% | 1.46% |
| Toluene | 4.74% | 1.85% |
| Ethylbenzen | 0.85% | 0.44% |
| Xylene | 2.85% | 1.66% |
| Hexane | 0.60% | 3.45% |
| Isooctane | 0.00% | 0.00% |
| MTBE | 0.00% | 0.00% |

* Distillate factors are used for worst case scenario.

| HAPs | Distillate Pot TPY | Kerosene Pot TPY | Residual Pot TPY | Total Pot TPY |
|---|---|---|---|---|
| Benzene | 0.029 | 0.0009 | 0.09430 | 0.1243 |
| Toluene | 0.017 | 0.0012 | 0.05546 | 0.0737 |
| Ethylbenzene | 0.003 | 0.0003 | 0.00995 | 0.0133 |
| Xylene | 0.010 | 0.0011 | 0.03335 | 0.0447 |
| Hexane | 0.002 | 0.0022 | 0.00702 | 0.0114 |
| Isooctane | 0.000 | 0.0000 | 0.00000 | 0.0000 |
| MTBE | 0.000 | 0.0000 | 0.00000 | 0.0000 |

| Criteria Pollutants | lb/hr | Pot TPY |
|---|---|---|
| Particulate Matter | 0.000 | 0.000 |
| Sulfur Dioxide | 0.000 | 0.000 |
| Nitrogen Dioxide | 0.000 | 0.000 |
| Carbon Monoxide | 0.000 | 0.000 |
| Volatile Organic Compounds | 0.364 | 1.595 |

**Chelsea Sandwich LLC**
**Process Calculation Sheet**

Process ID#: 2-2
Organic Liquid (<1.5 psi) Tank Truck Loading

| Emission factor | | Distillate Throughput | Potential gal/yr | Potential gal/hr |
|---|---|---|---|---|
| 0.0400 | lb/$10^3$ gal* | Kerosene | 15,000,000 | 1,712 |
| 0.0300 | lb/$10^3$ gal* | Distillates | 438,000,000 | 50,000 |
| 0.0142 | lb/$10^3$ gal (calculated after control) | Residual Oil | 500,000,000 | 57,078 |

* AP-42 5.2-5 Total Uncontrolled Organic Emission Factors
for Petroleum Liquid Rail Tank Cars and Tank Trucks (1/95)

8,760 Potential Hours/year (Distillate and Kerosene)

Max lbs/hr = Total gallons/hr * potential emission factor
Potential TPY (Distillate and Kero) = Max lb/hr * potential hours / 2000 lb/ton
Potential TPY (Residual) = Emission Factor (ppm) * exhaust rate (cfm) * 60 min/hour * hours/year * lb mole/cubic feet * lbs/lb mole / 2000lb/ton

Kero
0.068493151 Max lb/hr
0.300 Pot Tpy

Dist
1.5 Max lb/hr
6.570 Pot Tpy

Res
32.43 Pot Tpy uncontrolled
3.54 Pot Tpy controlled

NMVOC
34.002 Max lb/hr
10.405 Pot Tpy

**Residual Oil Calculation**
16,667 Potential Hours/year (Residual Oil)
2,000 ppm
300 cfm
407 cubic feet/lb mole
44 lbs/ lb mole

HAP Vapor Weight Percents[1]

| | Distillate / Residual* | Kerosene |
|---|---|---|
| Benzene | 8.06% | 1.46% |
| Toluene | 4.74% | 1.85% |
| Ethylbenzene | 0.85% | 0.44% |
| Xylene | 2.85% | 1.66% |
| Hexane | 0.60% | 3.45% |
| Isooctane | 0.00% | 0.00% |
| MTBE | 0.00% | 0.00% |

* Distillate factors are used for worst case scenario.

| HAPs | Distillate Pot TPY | Kerosene Pot TPY | Residual Pot TPY | Total Pot TPY |
|---|---|---|---|---|
| Benzene | 0.530 | 0.0044 | 0.2855 | 0.8194 |
| Toluene | 0.311 | 0.0056 | 0.1679 | 0.4849 |
| Ethylbenzene | 0.056 | 0.0013 | 0.0301 | 0.0873 |
| Xylene | 0.187 | 0.0050 | 0.1010 | 0.2932 |
| Hexane | 0.039 | 0.0104 | 0.0213 | 0.0710 |
| Isooctane | 0.000 | 0.0000 | 0.0000 | 0.0000 |
| MTBE | 0.000 | 0.0000 | 0.0000 | 0.0000 |

| Criteria Pollutants | lb/hr | Pot TPY |
|---|---|---|
| Particulate Matter | 0.000 | 0.000 |
| Sulfur Dioxide | 0.000 | 0.000 |
| Nitrogen Dioxide | 0.000 | 0.000 |
| Carbon Monoxide | 0.000 | 0.000 |
| Volatile Organic Compounds | 34.00 | 10.41 |

Chelsea Sandwich LLC
Process Calculation Sheet

Process ID#: 1-3
RTO Combustion Emissions
Vendor Emission Factors
Natural Gas combustion

| | | |
|---|---|---|
| PM | 7.60 | lbs/10^6 scf |
| CO | 50.0 | ppm |
| $SO_2$ | 0.6 | ppm |
| $NO_x$ | 3.0 | ppm |
| VOC | 5.50 | lbs/10^6 scf |
| PM2.5 | Same as PM | |
| PM10 | Same as PM | |

| | |
|---|---|
| Cubic Feet per minute | 9,000 |
| Million Cubic Feet per year | 6.3 |
| Lbs per Lb Mole - $NO_x$ | 46 |
| Lbs per Lb Mole - $SO_2$ | 64 |
| Lbs per Lb Mole - CO | 28 |
| | |
| Cubic Feet per Lb Mole | 385 |
| Pounds per ton | 2,000 |
| Potential hours per year: | 8,760 |
| Minutes per Hour | 60 |

Calculations
Potential TPY = Emission Factor (ppm) * cubic feet/minute * 60 min/hour * hrs/year * lb mole/cubic feet * lbs/lb mole / 2000 lbs/ton
Potential TPY = Emission Factor (lbs/10^6 scf) * Million Cubic Feet/year / 2000 lbs/ton

| Criteria Pollutants | Pot lb/hr | Pot TPY |
|---|---|---|
| Particulate Matter | 0.005 | 0.024 |
| Carbon Monoxide | 1.964 | 8.60 |
| Sulfur Dioxide | 34.442 | 0.24 |
| Nitrogen Dioxide | 0.194 | 0.85 |
| Volatile Organic Compounds | 0.004 | 0.017 |
| Particulate Matter 2.5 | 0.005 | 0.024 |
| Particulate Matter 10 | 0.005 | 0.024 |

Chelsea Sandwich LLC
Chelsea, Massachusetts
Tank Summary

| Tank Number | Tank Contents | Tank Capacity (Gallons) | Potential Tank Throughput (Gallons) | Total VOC |
|---|---|---|---|---|
| 101 | No. 2 Oil | 840,000 | 252,000,000 | 0.77 |
| 105 | No. 2 Oil | 840,000 | 252,000,000 | 0.77 |
| 107 | LSD | 504,000 | 151,200,000 | 0.46 |
| 108 | No. 2 Oil | 840,000 | 252,000,000 | 0.77 |
| 109 | LSD | 840,000 | 252,000,000 | 0.77 |
| 110 | Fuel Add | 30,000 | 39,000,000 | 0.10 |
| 111 | Fuel Add | 30,000 | 39,000,000 | 0.51 |
| 115 | Slop | 30,000 | 39,000,000 | 0.08 |
| 114 | Fuel Add | 4,000 | 200,000 | 0.00 |
| 116 | LSD | 5,200 | 260,000 | 0.00 |
| 117 | Fuel Add | 3,000 | 150,000 | 0.00 |
| 201 | No. 2 Oil | 4,200,000 | 210,000,000 | 2.21 |
| 205 | No. 2 Oil | 5,040,000 | 252,000,000 | 2.53 |
| 102 | No. 6 Oil | 840,000 | 12,508,929 | 15.40 See Attatched Calculation |
| 103 | No. 6 Oil | 840,000 | 9,799,806 | |
| 104 | No. 6 Oil | 840,000 | 9,953,217 | |
| 106 | No. 6 Oil | 840,000 | 10,815,030 | |
| 202 | No. 6 Oil | 5,040,000 | 62,635,483 | |
| 203 | No. 6 Oil | 3,150,000 | 31,221,666 | |
| 204 | No. 6 Oil | 3,990,000 | 62,452,930 | |
| BH1 | No. 6 Oil | 1,000 | 400,000 | 0.00 |
| BH2 | No. 6 Oil | 1,000 | 400,000 | 0.00 |
| | | | | |
| **Total Emissions** | | | | 24.37 |

Chelsea Sandwich LLC

Residual Oil Calculation Sheet

| Factors | | |
|---|---|---|
| Potential Inlet concentration | 2000 | ppm |
| Exhaust Flow rate | 4300 | scfm |
| Hours per year | 8760 | |
| Cubic feet per pound mole | 385 | |
| Pound per pound mole | 44 | |
| Pounds per ton | 2000 | |

**Potential TPY Calculation**

**Potential Tons per Year** = 2,000 cubic feet/1000000 cubic feet * 4,300 cubic feet/minute * 60 min/hour * 8760 hours/year * 1 lb mole/385 cubic feet * 44 lbs/lb mole * 1 ton/2,000lbs

| | |
|---|---|
| **Potential** | 258 tpy |

| Control Factors | |
|---|---|
| Capture Efficiency | 95% |
| VOC destruction efficiency | 99% |

**Controlled Potential TPY Calculation**

**Controlled Tons per year** = (potential tpy * .05)+((potential tpy*.95)*.01)

| | |
|---|---|
| **With Control Strategy** | 15.4 tpy |

Chelsea Sandwich LLC
Chelsea, MA
HAP Emissions Summary (Pounds)

| Losses (lbs.) | | | | | | |
|---|---|---|---|---|---|---|
| **Tank ID** | **Benzene** | **Ethylbenzene** | **Isooctane** | **n-Hexane** | **Toluene** | **Xylene** |
| 101 | 3.20 | 4.82 | | 0.66 | 36.13 | 89.49 |
| 105 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 107 | 1.91 | 2.88 | 0.00 | 0.39 | 21.57 | 53.44 |
| 108 | 3.20 | 4.82 | 0.00 | 0.66 | 36.13 | 89.49 |
| 109 | 3.20 | 4.82 | 0.00 | 0.66 | 36.13 | 89.49 |
| 110 | 0.32 | 0.49 | 0.00 | 0.07 | 3.66 | 9.08 |
| 111 | 1.63 | 2.46 | 0.00 | 0.33 | 18.44 | 45.69 |
| 114 | 0.01 | 0.01 | 0.00 | 0.00 | 0.10 | 0.24 |
| 115 | 0.32 | 0.49 | 0.00 | 0.07 | 3.66 | 9.08 |
| 116 | 0.01 | 0.02 | 0.00 | 0.00 | 0.13 | 0.31 |
| 117 | 0.01 | 0.01 | 0.00 | 0.00 | 0.07 | 0.18 |
| 201 | 9.18 | 13.83 | 0.00 | 1.88 | 103.69 | 256.86 |
| 205 | 10.51 | 15.84 | | 2.15 | 118.74 | 294.17 |
| 102 | | | | | | |
| 103 | | | | | | |
| 104 | | | | | | |
| 106 | 1.24 | 0.13 | 0.00 | 0.09 | 0.73 | 0.73 |
| 202 | | | | | | |
| 203 | | | | | | |
| 204 | | | | | | |
| BH1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| BH2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

No. 6 Oil Tanks

**M. J. Bradley & Associates**
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# MEMO

**TO:** Tom Keefe
**FROM:** Steve Piper
**Cc:** Ron Kenny
**DATE:** April 1, 2008
**RE:** Chelsea Terminal Rack Exhaust Testing

On March 7, 2008, myself and Paul Murphy collected air samples from the residual oil loading operations as a means to better characterize the rack contribution to the overall VOC emissions ducted to the existing odor control device. During previous testing efforts sampling focused on the combined exhaust of the residual oil storage tanks and the residual oil rack loading lanes as well as sampling of individual tank within the tank farm. During pre-permit application meetings with the MADEP, they expressed interest in knowing how the actual residual oil loading rack emissions compared with EPA-published emission factors (AP-42).

The test plan was to collect a total of six bag samples; three from the headspace of trucks during residual loading (splash loading), and a corresponding three samples from the flex hose collecting the displaced vapors from the residual oil loading. The bag samples were then taken to a nearby lab for analysis using Method 25A (calibrated to propane). Results of the sample analyses are summarized below.

| Residual Oil Type | Truck Headspace (ppm) | Vapor Collection Duct (ppm) |
|---|---|---|
| 2.2% | 2,860 | 1,120 |
| 1.0% | 6,100 | 1,900 |
| 0.5% | 4,350 | 4,700* |
| AVG | 4,437 | 1,510 |

*Sample disregarded, suspect that the sampling tube was contaminated with oil residue.

The average headspace concentration in the trucks of 4,437 ppm was slightly higher than the average headspace concentrations in the residual oil storage tanks of 3,547 ppm (a lot more samples collected). The difference seems rationale given that the truck were testing during an active top loading event whereas the majority of tank samples were collected during periods of no activity.

An attempt was made to measure the actual flow in each vapor collection duct. The purpose was to confirm the design exhaust rate of 300 cfm per loading lane and to

provide for and ability to calculate the capture efficiency. However, the pitot tube repeatibly became clogged by the tar buildup on the inside of the flex hose during each attempt to measure flow.

To calculate potential emissions from the residual loading rack lanes, we used the residual oil throughput limitation of 500,000,000 gallons/year (from Ron Kenny) and the loading pump rate of 500 gallons/minute to calculate that the loading could operate 16,667 hours/year (for one lane or less hours for multiple lanes). To convert from VOC concentration (ppm) to annual quantity of VOC emissions, the design exhaust rate of 300 cfm and the ideal gas law for a 100 $^0$F air steam was used. For the purpose of "potential" emission calculation, a concentration of 2,000 ppm was used (5% higher than highest test result and consistant with concentrations measured at the control system inlet. Based on the 2,000 ppm potential concentration, the potential uncontrolled VOC emissions (as propane) from truck loading of residual oil would be 32.4 tpy.

$$\frac{2{,}000\ ft^3}{10^6\ ft^3} * \frac{300\ ft^3}{min} * \frac{60\ min}{hour} * \frac{16{,}667\ hr}{year} * \frac{lb\ mole}{407\ ft^3} * \frac{44\ lb}{lb\ mole} * \frac{1\ ton}{2{,}000\ lb} = 32.4\ tpy$$

Back-calculating the uncontrolled emission factor would indicate that the residual oil truck loading operation emits 0.13 lb/$10^3$ gallons loaded. The current emission factor published by EPA (AP-42) in 0.0003 lb/$10^3$ gallons loaded.

Based on the emission control strategy being proposed of 90% capture efficiency and 99% VOC destruction efficiency of the captures vapors, the controlled potential emissions would be 3.5 tpy from residual truck loading.

$$\left[\frac{0.13\ lb}{10^3\ gal} \cdot (1 - 0.9\ capture)\right] + \left[\frac{0.13\ lb}{10^3\ gal} (0.9)(1 - 0.99\ control)\right]$$

$$0.013 + 0.0012$$

$$After\ Control = 0.014\ \frac{lb}{10^3\ gal}$$

Cole page says $0.0142\ \frac{lb}{10^3\ gal}$

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# MEMO

**TO:** Tom Keefe
**FROM:** Steve Piper
**Cc:** Ron Kenny
**DATE:** April 2, 2008
**RE:** Chelsea Terminal Residual Tank Vent Testing

On several occasions from September thru November 2007 air sampling and testing was conducted to characterize emissions from the residual oil storage tanks as a means to understand why the bed life of the odor control device (dry scrubber) was shorter than anticipated. During the control inlet testing efforts there was little or no activity with residual oil truck loading. As such, the emission measured reflected only working and breathing losses for the residual oil storage tanks.

Initial testing involved the collection of bag samples from the headspace of residual oil tanks and corresponding samples at the inlet of the odor control system. The bag samples were then taken to a nearby lab for analysis using Method 25A (calibrated to propane). Results of the sample analyses are summarized below.

| Date | Tank Headspace* (ppm) | Emission Control Inlet (ppm) |
|---|---|---|
| Sept 19, 2007 | 5,700 | 1,660 |
| Sept 26, 2007 | 3,900 | 1,400 |
| Oct 15, 2007 | 2,750 | 825 |
| Oct 18, 2007 | 4,595 | 802 |
| Oct 22, 2007 | 2,910 | - |
| Oct 29, 2007 | 2,990 | 670 |
| Nov 5, 2007 | 3,660 | 820 |
| Nov 28, 2007 | 2,145 | 632 |
| | | |
| AVG | 3,456 | 973 |
| Range | 638 – 8,100 | 632-1,670 |

*Average of results from multiple tanks.

The average headspace concentration in the residual oil tanks of 3,456 ppm was slightly lower than the average headspace concentrations in the residual oil trucks during loading of 4,437 ppm. The difference seems rationale given that the truck were testing during an active top loading event whereas the majority of tank samples were collected during

periods with a range of conditions from empty with the heat off to active loading and air sparging at high temperatures.

The flow rate at the odor control inlet was measured on a few occasions with results ranging from 4,300 to 4,900 SCFM. To calculate potential emissions from the residual storage tanks, we used the flow rate of 4,300 SCFM and a maximum potential inlet concentration of 2,000 ppm (as propane). To convert from VOC concentration (ppm) to annual quantity of VOC emissions the ideal gas law for a standard air temperature was used. The worst case concentration of 2,000 ppm was reflects a 20% safely factor from the highest actual inlet concentration measured of 1,670 ppm and is consistent the concentration from the residual truck loading operation also going to the odor control system. Based on the 2,000 ppm potential concentration, the potential uncontrolled VOC emissions (as propane) from working and breathing losses from the residual oil storage tanks would be 258 tpy.

$$\frac{2{,}000\ ft^3}{10^6\ ft^3} * \frac{4{,}300\ ft^3}{min} * \frac{60\ min}{hour} * \frac{8{,}760\ hr}{year} * \frac{lb\ mole}{385\ ft^3} * \frac{44\ lb}{lb\ mole} * \frac{1\ ton}{2{,}000\ lb} = 258\ tpy$$

Calculating the residual oil tank working and breathing emissions using the traditional TANKS model published by EPA indicated that the potential VOC emissions from the seven heated tanks at Chelsea Terminal would only be 1.0 tpy.

Based on the emission control strategy being proposed of 95% capture efficiency and 99% VOC destruction efficiency of the captures vapors, the controlled potential emissions would be 15.4 tpy from residual oil tanks.

# TANKS 4.0.9d
## Emissions Report - Detail Format
## Total Emissions Summaries - All Tanks in Report

### Emissions Report for: Annual

| Tank Identification | | | | Losses (lbs) |
|---|---|---|---|---|
| Tank 101 | Chelsea Terminal Ltd. | Vertical Fixed Roof Tank | Chelsea, Massachusetts | 1,537.08 |
| Tank 105 | Chelsea Terminal Ltd. | Vertical Fixed Roof Tank | Chelsea, Massachusetts | 1,537.08 |
| Tank 107 | Chelsea Terminal Ltd. | Vertical Fixed Roof Tank | Chelsea, Massachusetts | 917.94 |
| Tank 108 | Chelsea Terminal Ltd. | Vertical Fixed Roof Tank | Chelsea, Massachusetts | 1,537.08 |
| Tank 109 | Chelsea Terminal Ltd. | Vertical Fixed Roof Tank | Chelsea, Massachusetts | 1,537.08 |
| Tank 110 | Chelsea Sandwich LLC | Horizontal Tank | Chelsea, Massachusetts | 203.99 |
| Tank 111 | Chelsea Sandwich LLC | Horizontal Tank | Chelsea, Massachusetts | 1,026.64 |
| Tank 114 | Chelsea Terminal, Ltd. | Horizontal Tank | Chelsea, Massachusetts | 5.43 |
| Tank 115 | Chelsea Sandwich LLC | Horizontal Tank | Chelsea, Massachusetts | 155.91 |
| Tank 116 | Chelsea Terminal, Ltd. | Horizontal Tank | Chelsea, Massachusetts | 5.40 |
| Tank 117 | Chelsea Sandwich LLC | Horizontal Tank | Chelsea, Massachusetts | 4.01 |
| Tank 201 | Chelsea Terminal Ltd. | Vertical Fixed Roof Tank | Chelsea, Massachusetts | 4,411.72 |
| Tank 205 | Chelsea Terminal Ltd. | Vertical Fixed Roof Tank | Chelsea, Massachusetts | 5,052.44 |
| Tank BH1 | Chelsea Terminal, Ltd. | Horizontal Tank | Chelsea, Massachusetts | 0.09 |
| Tank BH2 | Chelsea Terminal, Ltd. | Horizontal Tank | Chelsea, Massachusetts | 0.09 |
| Total Emissions for all Tanks: | | | | 17,931.97 |

# APPENDIX B

# STANDARD MAINTENANCE AND OPERATING PROCEDURES

March 3, 2008

**Global Petroleum**
**Chelsea Sandwich Terminal**
Chelsea, MA

**Regenerative Thermal Oxidation System Supplemental Information**

RTO Operating Controls

1. Operating and Safety Controls

The RTO system uses a natural gas burner system with a dedicated combustion air blower to provide the initial reaction zone warm up. This occurs for approximately 1 hour. During this time the fume collection fan is off and vapors are not collected and delivered to the RTO system.

After the initial warm-up cycle is complete, the start-up burner is shut down and the fume collection fan is started. Collected vapors are drawn from the tank farm and the truck loading stations and delivered to the RTO system.

Multiple thermocouples monitor temperatures throughout the RTO. If the inlet fume stream does not contain adequate fuel value to maintain the reaction temperature, supplemental natural gas is injected to compensate. This supplemental fuel gas is introduced at the fume fan inlet to encourage mixing with the fume stream. The fuel gas is modulated to maintain the reaction zone minimum temperature of 1500 F, adding supplemental fuel to approximately 3% of the LEL at the inlet of the ceramic beds.

Every 3-5 minutes, the PLC system will reverse the flow through the ceramic heat exchange beds in order to maintain optimum temperature profiles for preheating the stream and for recovering the heat of reaction prior to discharging the stream to atmosphere. The natural gas feed is shut off before initiating the reverse flow through a position change in the air actuated poppet valves. Once the flow direction has been reversed, the natural gas feed is turned back on.

The fume fan is complete with a VFD system, which can be adjusted manually to optimize the capture volume and to account for seasonal operation changes at the terminal.

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